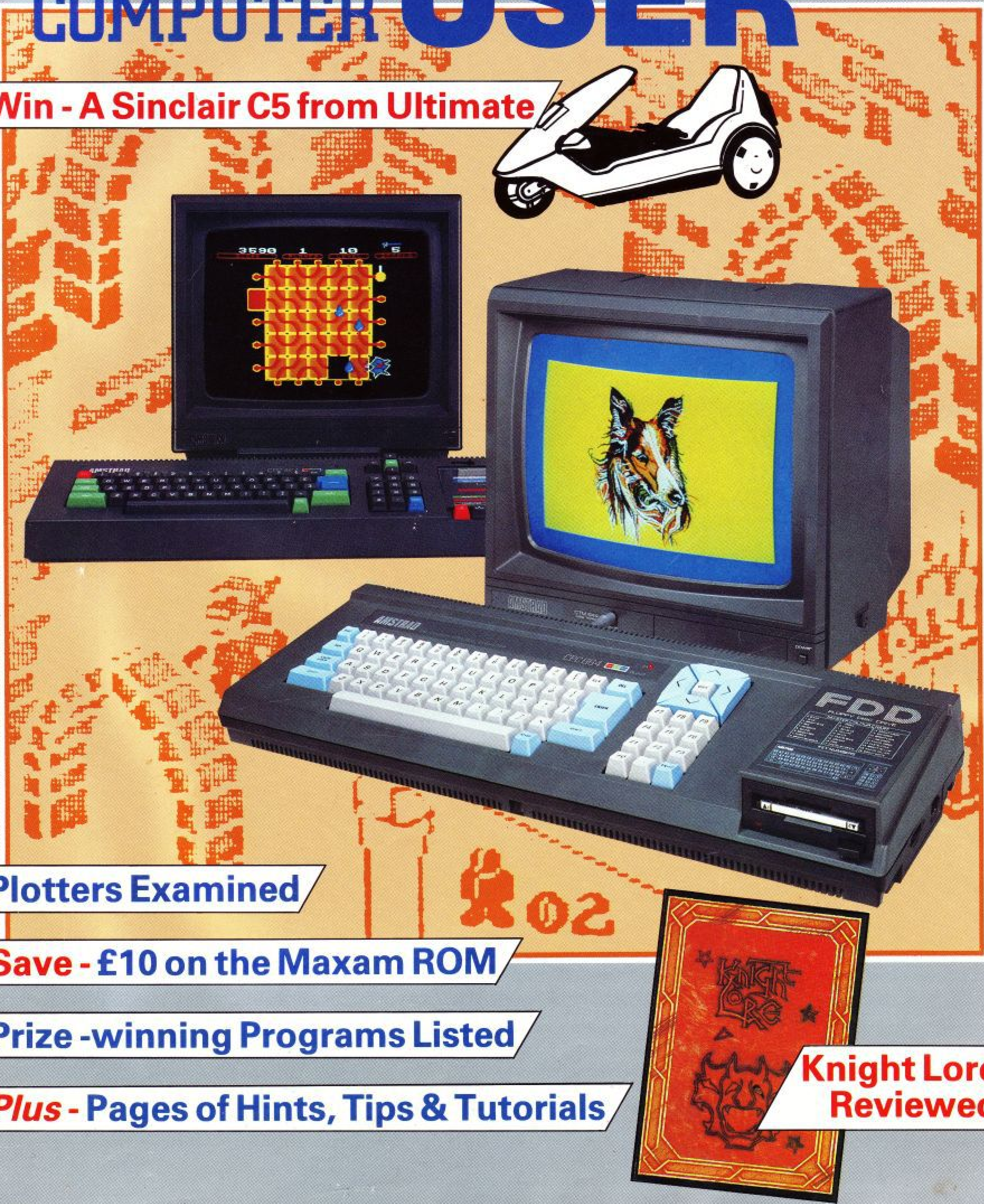
AMSTRAD COMPUTER USER

95p

June 1985

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Issue 7 June 1985

REGULARS

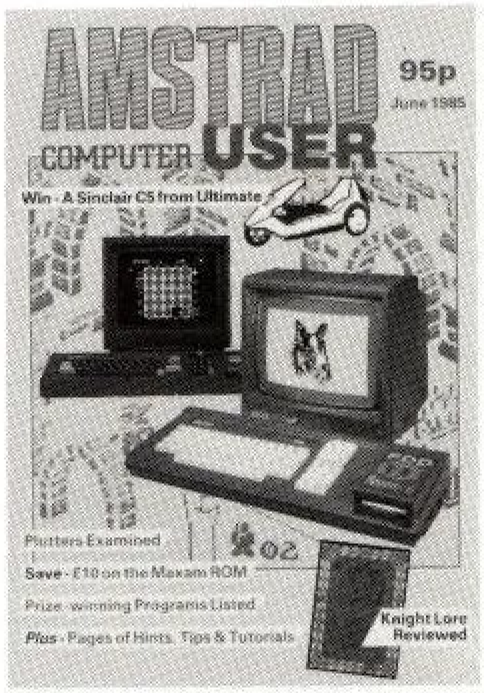
REVIEWS

FEATURES

PROGRAM

Competition

Amstrad User is the OFFICIAL magazine for users of the Amstrad CPC464and CPC664. It is published monthly, the next issue will be on sale from June 14th 1985. Back issues are avaliable from Amsoft Mail Order at £1.20 each (including postage).



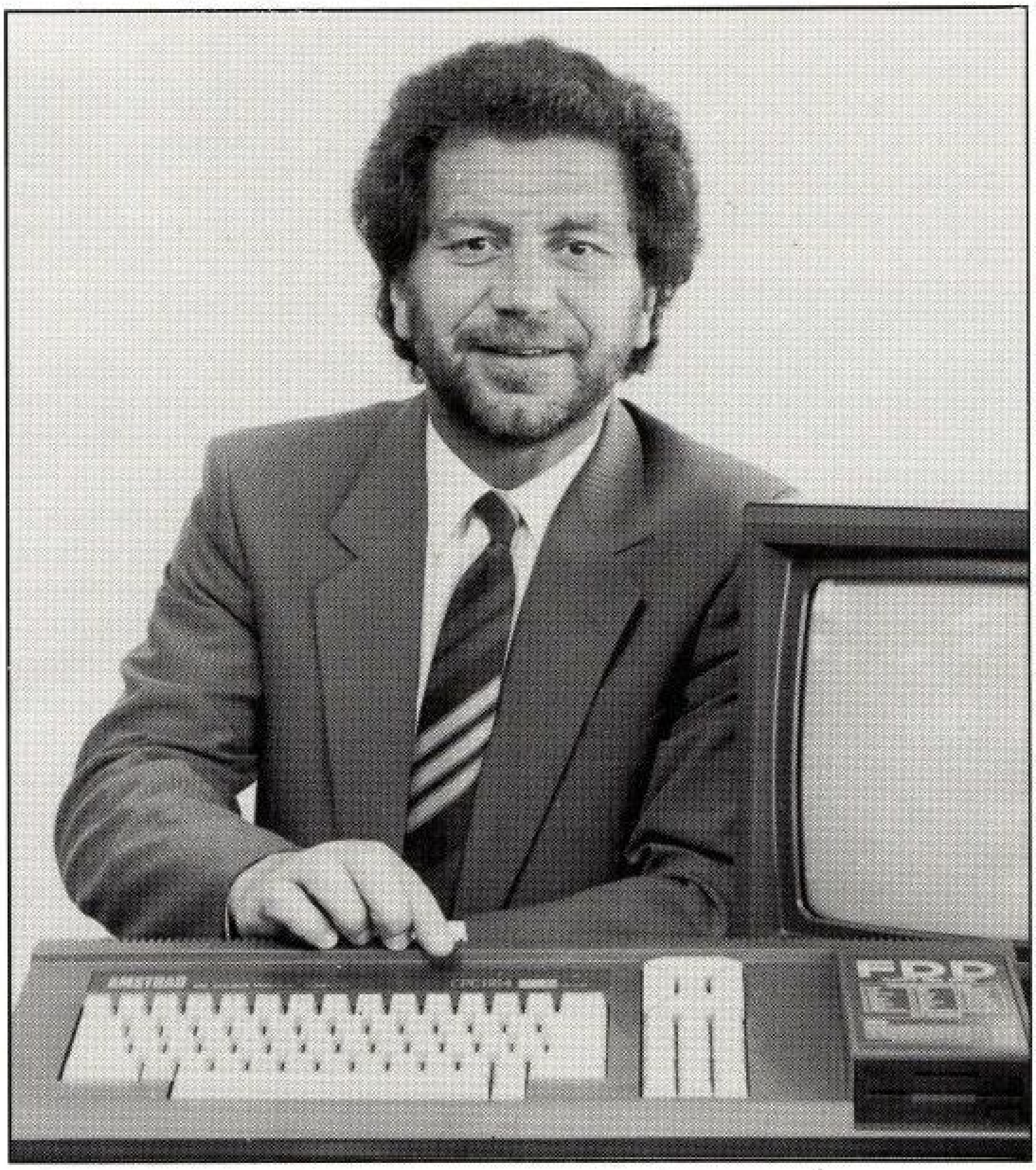
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USER NEWS

664 a Success!



Amstrad to Launch Serial Interface

If you want to talk to a modem, link computers together or even use some kinds of printers, you will need an RS232 interface. Amstrad have plans to introduce such an interface in mid-July.

It will be called the Amstrad RS232C and will plug into the disc expansion socket. The board will include a through bus so that other peripherals can be hung on the back. Unlike other RS232 interfaces the unit will include a ROM which contains a whole load of useful commands. These will take the form of RSX's which allow either characters or whole lines to be read or written from BASIC in a similar way to using the INKEY$ or LINE INPUT commands. Changing all the fiddly things like the baud rate will be a simple matter of using an RSX. Additional software will be included which will allow you to use Prestel. All this does not come cheap, the device will cost around £59.95

Better deal to club members.

Members of the user club can now benefit from free advertisments on the classified page. Only one ad per issue can be submitted and they will be set on a first come first served basis. We will refuse to print any advertisments which we suspect condone software piracy and reserve the right to refuse an ad without giving notice or permission. We may have to limit the number of advertisments due to lack of space. Please use the standard advertisment order form (or a photocopy) and limit your text to 30 words.

Amstrad User was very lucky to have scoop on the CPC664 last month. But while it is nice to have an exciting new computer to play with it is very hard to know what the rest of the world will think when it is launched. The general consensus was that it is a bargain.

At the launch Andrew Gardener interviewed Alan Sugar about the success of the '464, hopes for the '664 and what the future held for Amstrad. This interview - along with some questions from visting journalists produced some interesting information.

- 44% of Amstrad's business (Audio and computers) is overseas.
- Amstrad intends to sell 600,000 computers in 1985.
- Due to some 'mistakes' on the part of software houses not all '464 software will work with the new ROM.
- Amstrad are looking into the possibility of producing a computer with an integrated modem.
- There will be an audio Compact Disc player annouced this year.
- The CPC464 will not be dropped.
- The price of the 464 will not be cut to make it more competitive, however any cost savings made in the factory may be passed on.
- Amsoft are to launch some compilation discs with several games on each.

It was then time for a real hands-on session on the finished machines. All the computers on show were production models and the wine went down well (too well in some cases -Ed).

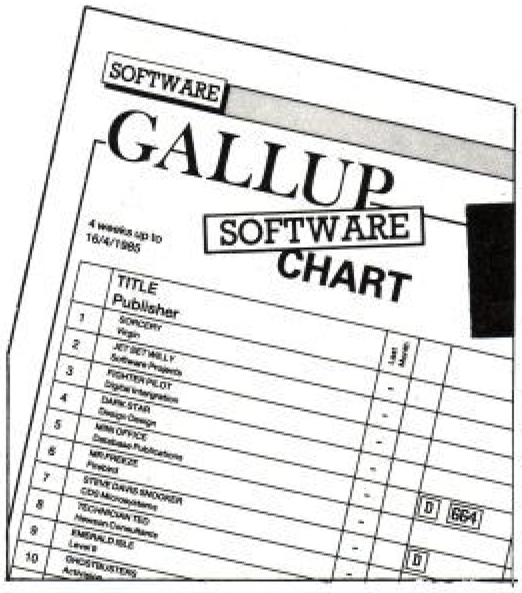
New software Chart

Starting this month Amstrad User will be printing an Amstrad only chart of the best selling software. The source of this information is Gallup who compile the general chart for Computer and Software Retailing - the magazine your dealers reads. At the moment no-one else uses the Amstrad figures, although many people including 'The Saturday Picture Show' use the general figures.

Because this is the first time the chart has been printed there are no figures for the number of months in the chart or for last months position.

The market strength figure tells you by how much one program is ahead of another. Some programs are sold both by Amsoft and by the software house which wrote the program. In this event the software house will be named but the Amsoft 'A' will appear in the wide column.

A program only earns the 664 Compatibility symbol if 'Amstrad User' has tested it and got it to work. We have not had our 664 for very long and so many programs which deserve the logo will not have it. Software houses should send us copies of any



programs which are likely to make the chart so that we can test them, even if we have had them before. (The editor is a messy chap and tends to lose things). If a disc version exists the compatibility will only refer to the disc. This means that if 'Roland at the Grand Prix' is sold as both a tape and a disc but only the disc will work with a CPC664 it will still have a little 664 in the wide column.

Remember the chart is independent. These are figures compiled from actual shops. It does not include mail order sales so any programs sold through the user club are not reflected.

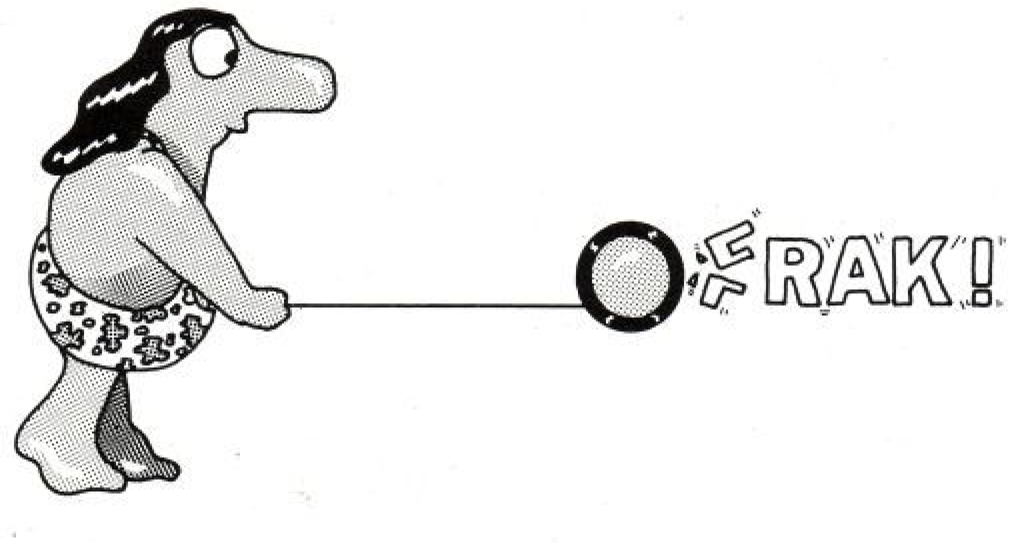
Read right

Global Software have produced a package to help you look after your Amstrad Datasette. Called "Computacare" the Amstrad version costs £9.95. For this you get more than just a program. The pack contains a very accurate azimuth adjustment program tape which runs whilst you fiddle with the alignment, a head cleaner with demagnetizer and a screwdriver to fit the cassette deck. Apprently a this screwdriver has to be made specially. You can order from Global Software, 33 Shelgate Road, London, SW11 1BA
01-222-1360 or try your local dealer.

Mapped Out.

Last month we promised a map of Jet Set Willy, well it proved to be such a big job that we have had to enlist the help of Software Projects. There is still one room missing from our map (The Central Cavern) but we will do our very best to finish the game.

Frak!



One of the most successful games on Ye Olde BBC last year was Frak by Aardvaark software. This was then converted to the C64 and although it suffered from lower res graphics it gained from the extra memory. Frak is an odd game in which you play the part of a caveman who has to climb ladders and run along platforms in his quest for keys. The novel feature is his weapon. When you press the fire button a yo-yo shoots out to kill the nastie.

The Amstrad version which is due out shortly will combine the best of both worlds. There will be up to 256 levels and a whole set of competitions. The ' Grand master Frak challange'. will have a 1st prize of an original Frak illustration, 2nd a cuddly 'Trogg', and 3rd £25 of software.

Looking in the Mirror.

Mirrorsoft are launch their famous name educational software in mid May. It is aimed at 5-7 year olds and the suitably famous names are the Mr Men. The first two programs will be "First steps with the Mr Men" and "Here and There with the Mr Men". There will also be a kiddies adventure called "Caesar's Travels". The programs will cost between £7.95 and £8.95.

Computers Today.

It has been brought to our notice that many of our readers who have ordered monitor extension leads from Computers Today of Bromley, Kent are having a lot of trouble in obtaining the goods. We would advise you to check availability before sending any money.

The lucky sextet.

Here are the winners of the DK'Tronics speech synth competition. Each of them should have their unit by the time you read this. They are: Peter Phillips - Co. Antrim in N. Ireland, Simon Tracey - North Humberside, Steven Sell - Bishops Stortford, Martin Holland - Wigan, A. Reid - Surrey and Karen Westley - Sheffield. They were really very lucky, we had over 3,000 correct entries. There were eleven differences between the two pictures. Winners of the Melborne House book competition will be announced next month.

Flaming Success

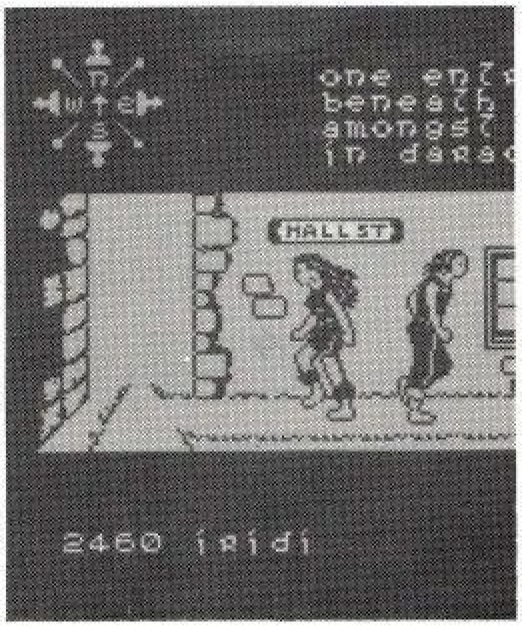
British Telcom Firebird have been very successful with their range of dirt cheap (£2.50) games. They have a few more due for release shortly. There will be an adventure called "Subsunk" and written using Gilsofts Quill, "Short's Fuse" is an arcade/ladders & platforms. "Don't Panic" is a similar sort of game which has been quite successful on the Speccy and has graduated to the Amstrad. Two Autumn releases are Booty and a 3D Graphic Adventure.

More from Ultimate.

Following hard on the heels of the Amstrad version of Knight Lore is the latest Ultimate epic - Alien 8. This features the amazing solid graphics featured in Knight Lore but has some novel additions. In some rooms your character controls a robot bomb disposal machine. The game should be availiable shortly and will cost £9.95

Welsh Walking.

Dun Darach may be unpronounceable but it is a great game. If a label has to be found for it then perhaps it would be best called an "adventure simulation". Even when the adventure is solved it is possible for the player to keep on wandering through the adventure. There is endless scope for barter, the program has its own economics and village life. The aim of the program is for you, a character called 'Cuchulainn', to find and rescue your companion (known as Loeg) who is imprisoned in the city. The animation within the program is excellent - the hair is particularly well done. The game will cost £9.95 and will be on sale in June.



ROMs Roll on.

Micropower will shortly have a seven ROM board to plug into the back of the CPC464. The box looks a lot like the one used to house the DDI-1 interface. Initially there will be two ROMs. These take the form of a Mailing List (database) and a disc utillities ROM. The really nice thing is that the software sits in the ROM the whole time and can be called when needed. Initial purchasers of the ROM board will get a free game.

Cheap Colour from X-data

Colour printers are usually an expensive item and well beyond the budget of the average home user. However that was the situation with colour computers five years ago. Now X-Data have a rather natty little printer which prints full colour pictures. No Amstrad software exists for it yet but if the device takes off, as it deserves to, there should be some soon.

Preaching Amstrad.

Software houses seem more willing to convert than the average Jehovah's Witness. The next two programs from Vortex Software will be Android two and T.L.L. The editor has been waiting for T.L.L. for months and be insufferable until it arrives. T.L.L. stands for Tornado Low Level and has the player flying over a beautifully scrolling background looking for things to pick up. Lets hope the program benefits from the conversion.

When software houses are not in the middle of converting software they are busy writing it for both the Amstrad and something else. In this case the program is called Highway Encounter and will be on sale very soon. Highway Encounter will cost £8.95, Android Two and TLL will both be £7.95.

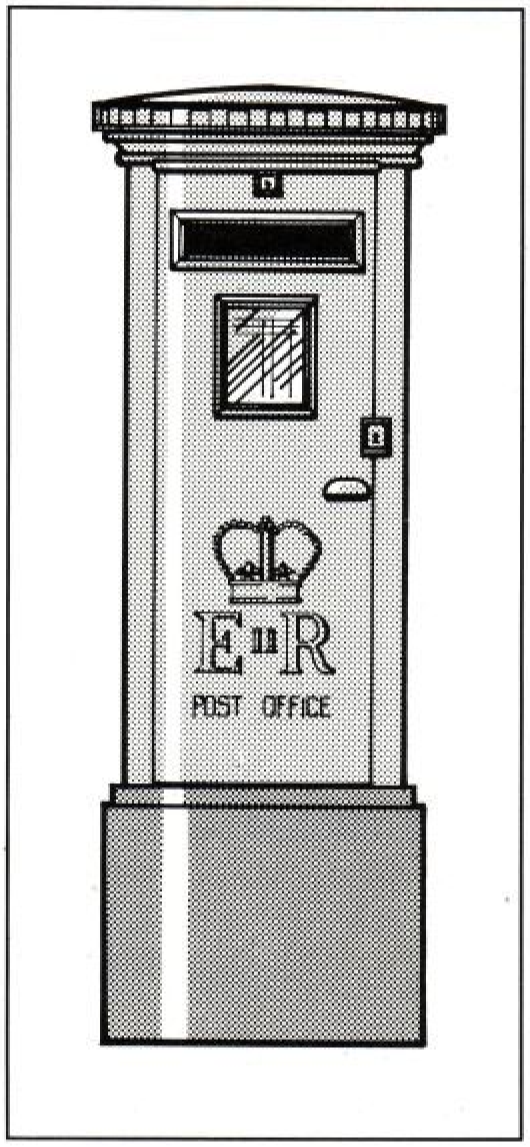
Stateside Smashes.

Ariolasoft is a company which thinks that computer programs are just like records and have brought an air of showmanship and slickness to the industry. They have set about importing and converting US hits. The first three programs are just avaliable. They are called "Archon", "One-On-One" and "Hard Hat Mack".

"One-on-One" is a basketball game in which the player can either take the role of attacker or defender standing at the basket. "Hard Hat Mack" is a ladders and platforms game in which the player has to avoid various building site hazards and put together the building. The most interesting game of all is "Archon". This is the result of crossing chess with Dungeons and Dragons. When one piece is moved onto the same square as another, a battle ensues. Different pieces have different properties, some can imprison other pieces on a square, pieces can be killed and resurected. It is a bit pricey "Archon" is £10.95 and the others are £8.95 There are no plans for disc versions.

Write to reply

Please bear in mind that the views expressed herein are not necessarily those of Amstrad or Amsoft. Be assured that all your views are given thorough consideration. This letters section is the Amstrad Computer User's own forum.



Hi scores

I am very impressed with your magazine which made me write in. I presently have 27 games which keep me amused, and I have just bought 4 games (Message from Andromeda, Jewels of Babylon, Fruity Frank and Galaxia) which are great.

Please could you tell me if there is a bug in Ghouls and, if so, how to solve it. When I get onto the second screen the bonus drops so rapidly its impossible to succeed.

Another thing, please, please, please could you tell me how to get over the river on Fantasia Diamond - I am well and truly stuck. Can you help?

Can you tell me how to get past the mirror in 'Message from Andromeda'.

I think a Hi Score table would improve the magazine or a feature with their hiscore for different games. A different selection of games each month, for instance Harrier Attack 83,677 or Roland on the Ropes 70,500 (both by my brother).

Here are some of my own:

Roland Ropes	129,000
Spannerman	60,000
Dragons Gold	2,000
Harrier Attack	83,000
Roland digging	£120
Gilligans Gold	29,000

As you can see I play with my CPC 464 a lot.

J. Sloan

ACU : We're quite sure that someone will recognise your plight in the various games and write in with the solutions. As for the Hi Score table, it seems like a good idea - but please mark your envelopes clearly with HI-SCORE on the bottom left.

Receiving you loud and clear

I felt I must write to say thank you for the transmissions of Amstrad software on television the other morning. As we are complete novices at computing we were pleased to have a go at recording it. We felt a great sense of achievement when we got all the programs out, although we had to use both recordings to do it. We're in our 50's and bought our colour Amstrad last Christmas, so we are complete novices, and if we can use it to help in our business we will be very pleased.

So thanks again for your journal and for the transmissions.

D. W., Redruth, Cornwall.

Pyjamarama undone (well and truly)

After reading the review on Pyjamarama I decided to write in with a few tips (the entire solution!) I will not tell you all of the rooms, just the objects to collect. Here goes, but first the brief tips in case readers don't want the entire works.

1. Filling a bucket with water stops the plants from snapping.
2. To get the crash helmet you need the help of the driving licence and the ignition keys.
3. A full lazer gun keeps the aliens at bay.
4. The crash helmet stops the book killing you.
5. 'Spend a penny' where else but in the loo!
6. The fire extinguisher puts the fire out (never!).

Pick up the empty bucket, go to the bathroom and stand under the tap to fill it. Leave the bucket in the room where the snapping plants are, to stop them snapping pick up the BP and fill it with fuel. Leave the full can somewhere safe. Pick up the pound coin and change it for the penny, this enables you to 'spend the penny in the loo'. Get the hammer from the toilet and you can then smash the glass in the lift room and you can now put out the fire at the bottom of the chimney pots. Walk through the fire, drop down and walk towards the square key. Pick it up and drop down. The square key enables you to go into the snooker room to get the lazer gun. Go to the lift room, out into room three and collect the triangle key. With the lazer gun and the triangle key go to room one and from there use the power pack to fill the gun. Pick up the fuel can and the gun and go up in the rocket. The aliens will be high up because you have the gun. Leave the gun on the moon. Go up in the rocket again and then fill the fuel can with fuel and leave it somewhere safe. Now pick up the driving licence which allows you to get the ignition keys. With the keys, slide down the banisters to pick up the crash helmet, keeping the crash helmet, get the library ticket which lets you collect the library book.

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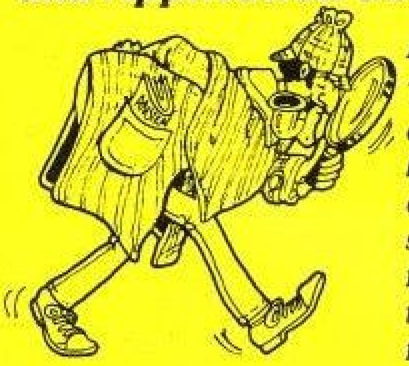


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With these two objects you can walk through the moving book and collect the scissors.

Turn the help arrow to down and it will put a tea chest in the room with the box key in it. Now go to that room and, because you have the scissors, you can go up in the balloon and get the box key. Open the box and get the magnet. Collect the fuel can and go up in the rocket. Once on the moon go out of the far door and you can break the magnetic lock and get the Clock key. All you have to do now is find the room with the alarm clock in and wind up the clock!

Caroline Barber, Chapel Park,
Newcastle-on-Tyne.

The un-Protector

I am very satisfied with my CPC and have just completed my first DECENT game. I am happy with it because (i) it proves I can program on the CPC, and (ii) my family love it and say I ought to send it to a magazine like your own.

So with this encouragement, I saved it in protected mode as I was just experimenting with this new type of saving. I then verified it and ran the program. Then, after a while of messing around, I erased it from Arnold's memory not thinking of how it was saved. I now would like to break into the program but I have tried everything in my power to see the listing again, but it just won't co-operate with me.

You are my last resort. Does anybody know how to successfully list a protected program? There's probably loads of people who have made the same silly mistake as me.

Also could you publish a program than can design a graphic character, that is preferably multi coloured as it's pretty boring just looking at simple, one colour graphics.

M. M., W. Yorks.

ACU: Oops. There really is very little reason to save your own work in protected mode as you have discovered the hard way. If we told you how to un-do it, then it wouldn't be a protection scheme, would it?

Applications

I am a complete novice at computer programming, but I like working with the Amstrad CPC 464. I buy all your magazines in the hope that some day I will find help with my main interest, which is genealogical research. I require a program which will enable me to file a list of names, dates, etc. and be able to add to the list, sort them into either towns, or alphabetically.

Is there a Data Base I can buy which will enable me to do this, and secondly, would a floppy disc system be a better method of storage?

F.W., Ayrshire, Scotland.

ACU: Masterfile (Soft 914) is the best in-RAM database available - but there's also a program called Brainstorm (of which more in a later issue) which is an ideal medium for family tree management.

Errors

In December '84 I purchased an Amstrad 64K for my daughter's Christmas present. Despite three months of constant effort we cannot make any sense of the machine. The number of times we have copied programs from the User magazine are numerous and always the computer throws up 'Syntax Error' despite following the program to the letter and number. Are we stupid or is there a syntax error on our machine? Is there anyone I can contact to instruct us how to use this machine or at least test it so that we can confirm it's working properly?

Please help before the Amstrad 64K (along with the £350 it cost) goes out of the window!

M.J., Tamworth, Staffs.

ACU: We have already had a confession session in the last issue. Syntax errors are not hardware faults: and yes, the listings do have the occasional bug which the more experienced owner can spot quite readily. The novice is understandably stumped.

However, typing error is still the cause in 99% of such cases. The listings are now available on cassette or disc from Garwood (see elsewhere for details) so if you've got any enduring problems, you can run the program 'as she was wrote' without the translation processes involved in printing the listings.

That said, we think we've got the bugs out of the system by now - but there will always some characters that create problems until we can get a printer with a complete custom 8 bit character set.

Clean up computing!

I have just read B.I. Noyce's letter (March User Magazine) concerning the failure of his tape mechanism, i.e. it kept giving errors resulting in Read Error A or B. This same fault has occurred with my own machine when reading in the current CPC464 'Tape' magazine. However, it may seem that there is a simple remedy, i.e. a cassette head cleaning tape. With one pass of this tape the Read Error was gone.

It would appear that a deposit, not obviously apparent, soon builds up on the tape head with constant use. Perhaps you should organise reliability tests into this possible failure area, and then present the facts to users with suggested remedies such as mine. One question has to be asked which is 'How hard are the tape heads used in the cassette and can they withstand the use of a cleaning tape indefinitely?'

M.S., Haxby, York.

ACU: The heads will last a long time: after all, a music playing system probably uses the cassette mech far more rigorously than an occasional program recording. Cheap tape is the prime culprit.

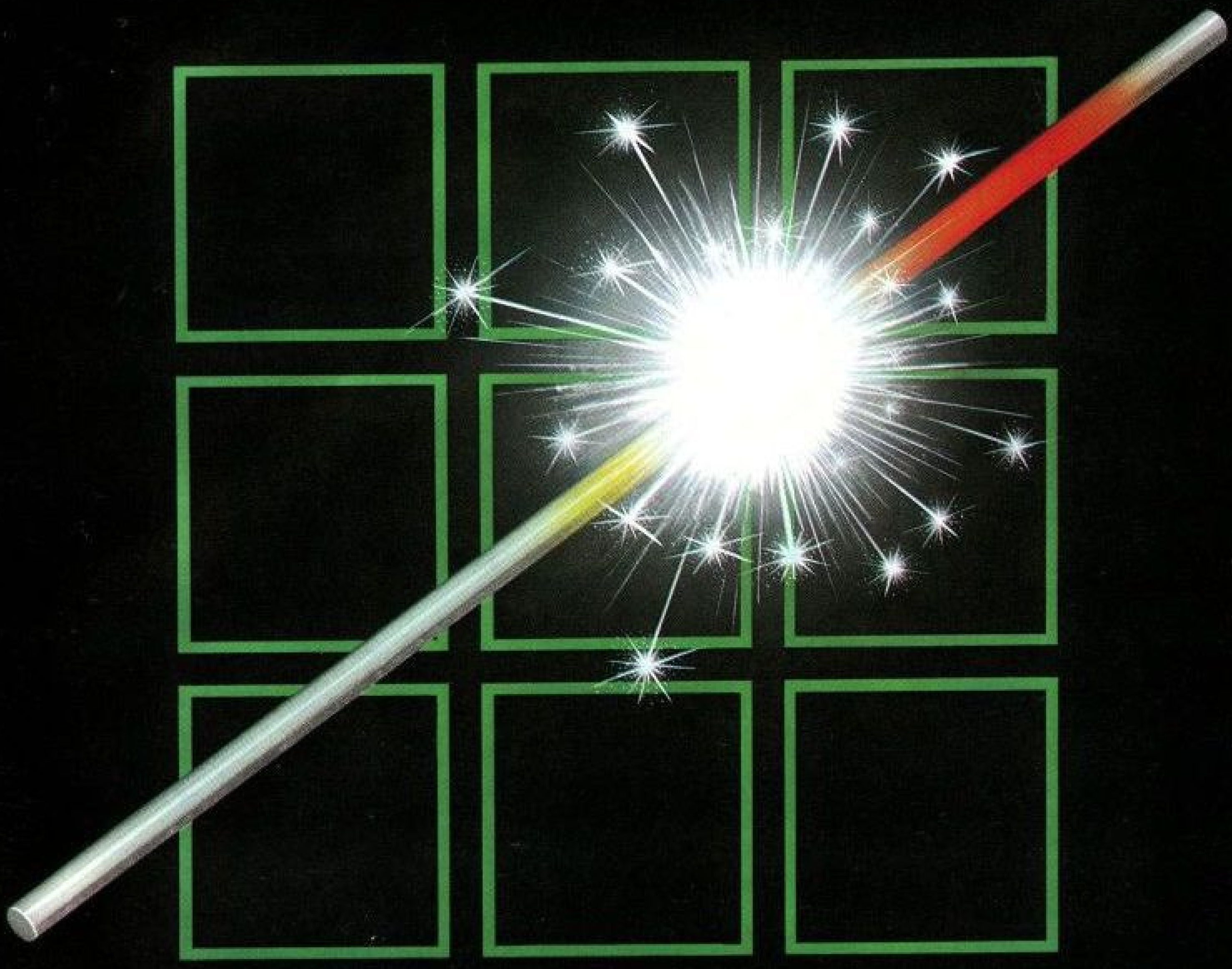
Indigestion in Babylon

Please could you help me in passing the cannibals in 'The Jewels of Babylon' and also going on to collect the treasure. I would be very grateful.

T.S., Densole, Folkestone.

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Exciting Times Ahead.....

A computer is a funny device. Most products are at their best when they are brand new. People go out of their way to buy the hi-fi or camera with all the latest attachments. If you did that with computers you would run aground when you wanted to use the system: from a lack of software.

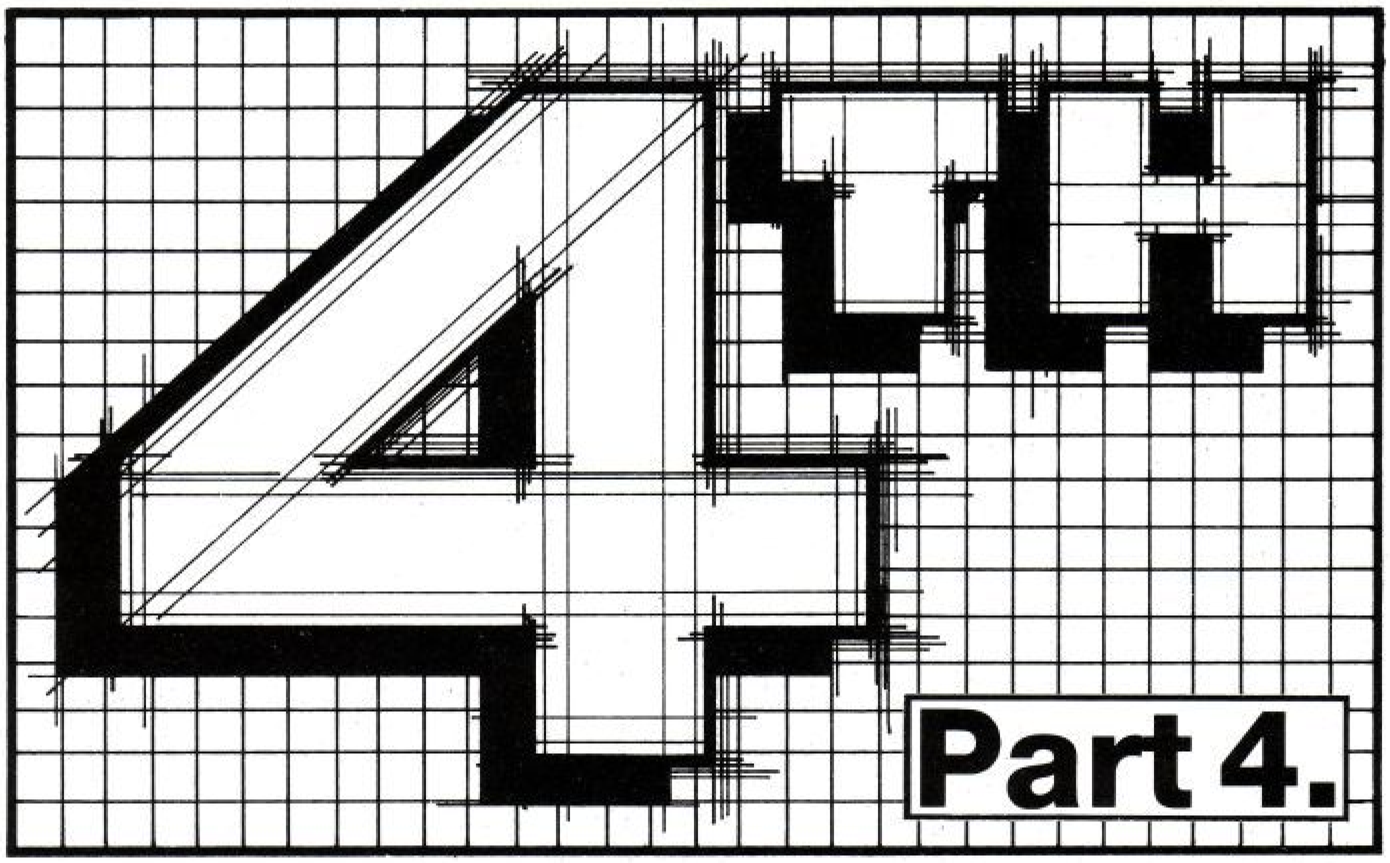
When the CPC464 was launched, Amstrad did their utmost to ensure there was good software support for the computer. Talk to any of the staff involved with the development of the 'Arnold' and they will tell you how the first fifty hand-build prototypes were shuffled from software house to software house so that the people who really wanted to produce the software would be given the chance to prove themselves.

Now the 464 is over a year old and the '664 is out on the streets. This later model is safe from software starvation, for not only does it run most of the '464 software, it also has CP/M and DR LOGO bundled with it. The 3 inch disc is presently a limitation for anyone trying to get hold of a particular package - but you can usually find someone willing to convert it.

From the point of view of software, the two computers are virtually the same; the effect that the 664 has is that there will now be a greater proportion of disc based machines. The Amstrad computer is no longer a new device and it is benefitting from that. Software is starting to appear which stretches the computer. If you look how long it took for programmers to get to grips with other computers, the time lag is surprisingly short. The CPC464 is a little over a year old and already we are begining to see some amazing software. O.K.- so both Knight Lore and Sorcery are conversions from the Spectrum but it took nearly two years for software of a similar quality to be made avaliable on Sinclair and Acorn machines. The CPC464 has better graphics than the Speccy and more memory than the Beeb so simple conversions are not streching it. Six months from now we will start to see the kind of programs which people will look at with awe. It is going to be an exciting time.

Just for fun I want to set a spontaneous competition. The way you call an RSX on the CPC is to use a `|`, (a 'bar' command). To to call basic you type `|BASIC`. A prize of a 'Roland in Space' tape is up for the five silliest names. For example a meal cooked out in the open is a `|BQ`, the place in London which houses major exibitions is the `|BCAN`. Roland Perry of Amsoft came out with `|HUMBUG` and Ivor Spital of Amstrad favours `|BILLIARDS`. The staff at Amstrad User enjoy a good laugh (strictly after working hours, you understand) so send us your ideas, but keep it clean.

Simon Rockman



In the previous articles we have seen how new FORTH words can be created, and also taken a look at the FORTH stacks, comparisons and loops. In this article we will be taking a look at other types of 'defining words' and a closer look at the structure of the FORTH dictionary.

Before we start, an apology and some corrections to part II of the series:

The word PEEK, page 68, col 1 : C0 should be C@

The word .S, page 68, col 1:
. "EMPTY STACK"ELSE
should read.
." EMPTY STACK " ELSE

Can't see the difference? When printing a string in FORTH, ." is a FORTH word and as such, a space is needed between it and the string. In fact on this point every string in the article has been printed incorrectly.

These spaces are vital to getting things right in FORTH.

The word PICK, page 70, col 2 : SP0 should read SP@

Also no space has been left between @ and THEN

The word .N, page 71, col 2 : C0 should read C@

Also no space has been left between the strings and U.

VARIABLES

Just as in BASIC, you can also use variables in FORTH. In BASIC you would say: LET X=15 or simply X=15. In FORTH you would say:

```
15 VARIABLE X
```

'X' is now a FORTH word, but because it is a variable, its operation at run time is different. If you now type X and then press [ENTER], the address of where the variable is stored in the FORTH dictionary will now be placed on TOS. To get the value of X, the FORTH word @ is used. This has the same effect as a BASIC PEEK. So:

```
X @ .
```

....will print the value of the variable X.

To change the value of X the FORTH word ! is used. This is the same as a BASIC POKE. To change the value to 25 then you would say:

```
25 X !
```

Variables created in this way use 2 bytes, and therefore can hold values from -32768 to 65535. Other types of Variables to use just one byte or four bytes can be created, as we will see later. It should be noted that FORTH does not rely on the use of variables as does BASIC or PASCAL. Generally speaking, the less variables that you use in FORTH, the better. The FORTH dictionary does contain some variables for its own use. These are known as USER VARIABLES. Some examples are BASE, WIDTH, FENCE, and CURRENT. The values for these variables are stored in a separate part of the dictionary known as the USER AREA. You can create your own USER variables by using the word USER instead of the word VARIABLE.

CONSTANTS

Like PASCAL, but unlike BASIC, it is possible to create a word that holds a constant value. Some examples could be:

```
12 CONSTANT DOZEN
32 CONSTANT FREEZING-POINT
212 CONSTANT BOILING-POINT
```

Typing the word DOZEN would then cause the value of 12 to be placed on TOS. Similarly, BOILING-POINT would place the value of 212 on TOS (in Fahrenheit!). This is useful if a certain value is likely to be used often.

The FORTH dictionary contains several of its own constants, including actual numbers such as 0,1 and 2 which are used often. The range of values that can be held in a CONSTANT are the same as those for a VARIABLE. Single, and double length constants can also be created. Naturally a CONSTANT is supposed to be constant, so its value cannot be altered - or more correctly, it should not be altered!

THE FORTH DICTIONARY

A knowledge of how the BASIC Interpreter works is not a prerequisite to good BASIC programming, but in FORTH a knowledge of how the Dictionary is complied is essential if you are to make use of the more powerful features of FORTH.

Let's see what happens when a word is complied into the dictionary. the new word is called CUBE and it simply takes the number that is TOS and replaces it with the cube of the number, i.e. 3 cubed = 27. The word is as follows:

```
: CUBE DUP DUP * * ;
```

Now if you refer to Figure 1 this shows how the word is compiled into the dictionary. The word HERE returns the address of the next available dictionary space, so this is where the new word will be complied from. This address will be known as the NAME FIELD ADDRESS (NFA) and the first byte will contain the length of the word NAME. In this case it will be 4. However, bit 7 of this address is always set, so the value of 128 will be added to 4, making a total of 132. The next four bytes in the dictionary will then contain the ASCII characters of the name. The last character in the name also has the value of 128 added to it. The next two bytes will then hold the LINK FIELD ADDRESS (LFA). This 'points' to the previous word's NFA address. In this way, all the words in the FORTH dictionary are linked together, and this is what FORTH uses to search through the words during compilation.

FIGURE 1

How the new word CUBE is stored in the FORTH DICTIONARY

```
LOW MEMORY

                  132    WORD LENGTH
                   67    ASCII  'C'
          NFA      58    ASCII  'U'
HEADER             66    ASCII  'B'
for               197    ASCII  'E' +128
CUBE      LFA   ?????    Points to previous words NFA
          CFA    5821    2 byte address of DO COLON
          PFA    5638    2 byte address of DUP
PARAMETER        5638    2 byte address of DUP
BLOCK            8849    2 byte address of *
of               8849    2 byte address of *
CUBE             5375    2 byte address of ;
                -free-
                -free-
              HIGH MEMORY
```

The next two bytes in the dictionary hold the CODE FIELD ADDRESS (CFA). This will point to the address of a routine which will be called when the word is 'run'. In this case it is the 'DO-COLON' routine. When the word CUBE is run (by typing CUBE), the DO-COLON routine causes the list of FORTH words stored in the PARAMETER BLOCK to be executed one after the other. The semicolon word marks the end of the list of words. If you like, the

DO-COLON can be thought of as a sort of 'GOSUB', and the semicolon as a corresponding 'RETURN'. A little calculation will show that the word CUBE has used up 19 bytes of memory space. A large proportion of the words in the FORTH dictionary are DO-COLON words, and will therefore have been complied into the dictionary in a similar manner to that just shown.

The HEADER part of the word will take the same format for all FORTH words, although the three most significant bytes of the NFA (the word length) can differ. Bit 7 is always set. Bit 6 is set if the word is a vocabulary word such as FORTH, EDITOR and ASSEMBLER. In this case the value of 64 is therefore added to this byte. Bit 5 is the 'smudge' bit (as mentioned in article 1). If this bit is set then the word is ignored during any dictionary searches. This will occur if a word is not complied correctly. The FORTH word SMUDGE toggles this bit 5, which as demonstrated in the first article, enables you to FORGET a word which was not complied correctly. Adding 32 to the value of a word's length byte will effectively erase it from the dictionary, although it can soon be re-instated by subtracting 32 from this same byte. You never know - it could come in useful!

The other difference in the header will be that the CFA will point to another routine. The CFA of a new word (defined by using CONSTANT) will point to the DO-CONSTANT routine. At run time, this routine will extract the value that is contained in the PARAMETER BLOCK of the constant in question. In this case, the PARAMETER BLOCK contains the value of the constant, and not a list of word addresses.

The CFA of a new word defined by using VARIABLE, will point to the DO-VARIABLE routine. At run time, this routine will place the address of the PARAMETER BLOCK on TOS, instead of the actual value held there, although the value is, like CONSTANT, stored in the PARAMETER BLOCK.

Figure 2 shows what the layout would look like if the following two words had been defined:

```
25 VARIABLE ABC
10 CONSTANT TEN
```

I have assumed that the next free byte in the dictionary was at location 10000 before the words were added. The words NFA, LFA, CFA and PFA will return the addresses 10000, 10004, 10006 and 10008 for the word ABC, and 10010, 10014, 10016 and 10018 for TEN. In the case of the LFA and CFA, it is the actual addresses that they point to that we are interested in. The LFA of TEN, for example, points to 10000, and the CFA of the same word point to 5887, which is the address of a machine code program which is called at run time. It may seem a little confusing at first, but if you study it a few times, it should soon all become clear.

FIGURE 2

Dictionary layout for ABC and TEN

```
NFA  10000   131     LENGTH  (3+128)
     10001    65     ASCII   ↑A'
     10002    66     ASCII   ↑B'
     10003   195     ASCII   ↑C' + 128
LFA  10004   ???     2 bytes pointing
     10005   ???     to NFA of last word.
CFA  10006    25     23 * 256 + 25 = 5913
     10007    23     Run time address routine.
PFA  10008    25     LSB value of ABC
     10009     0     MSB value of ABC
---------------------------------------------
NFA  10010   131     LENGTH  (3+128)
     10011    84     ASCII   ↑T'
     10012    69     ASCII   ↑E'
     10013   206     ASCII   ↑N' + 128
LFA  10014    16     39 * 256 + 16 = 10000
     10015    39     Link to NFA of last word.
CFA  10016   255     22 * 256 + 255 = 5887.
     10017    22     Run time address routine.
PFA  10018    10     LSB value of TEN.
     10019     0     MSB value of TEN.
---------------------------------------------
HERE 10020     -     Next free location.
```

The next free location in the dictionary after adding these two words would be at HERE - a FORTH word which will return the next available dictionary space.

Having got that lot out of the way, we can now see how it is possible to create new defining words of our own by using the two FORTH words ‹BUILDS and DOES›. These are probably the two most powerful words of any computer language!.

<BUILDS

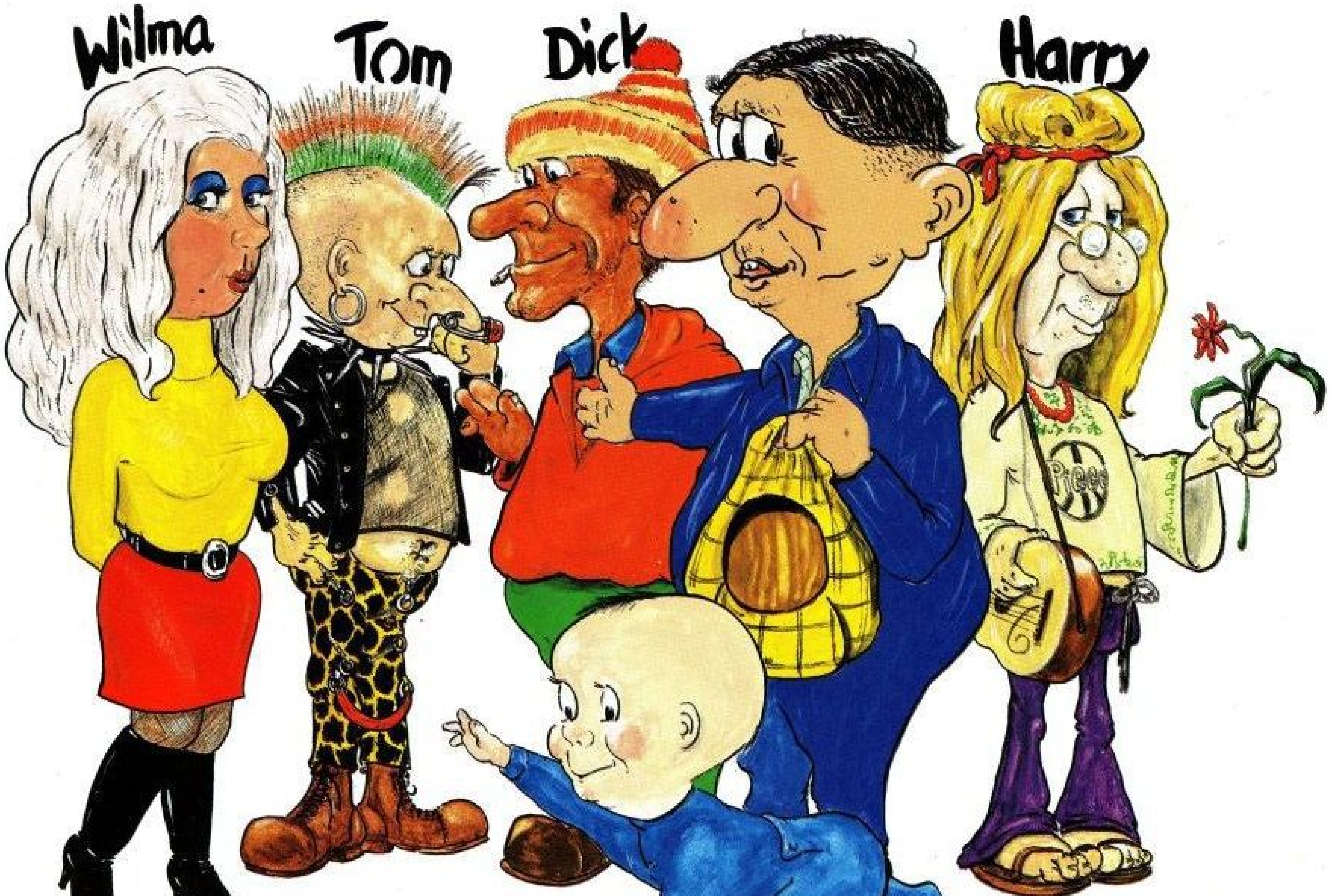
This word determines how new words are 'built' into the dictionary. You have already seen the difference between how a COLON word and a VARIBALE or CONSTANT are complied into the dictionary.

DOES>

This word determines the sequence of operations that will take place when the new word is 'run'.

The easiest way to explain is with some simple examples (and not by 'trial and error' as suggested in one FORTH manual!). We will create a new defining word called USELESS because, as its name suggests, it is a pretty useless word, although it does illustrate <BUILDS and DOES> in a simple manner. Try entering the following new word:

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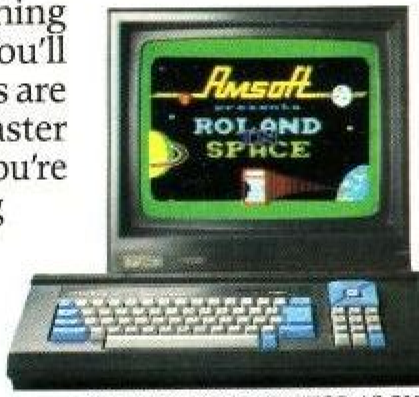
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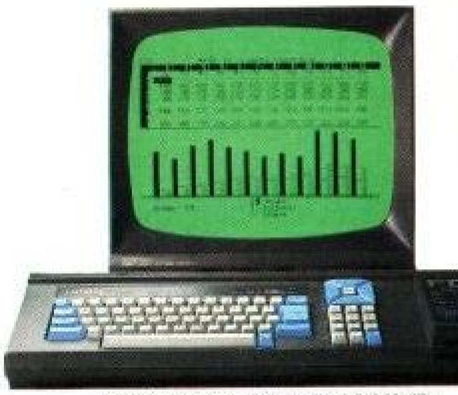
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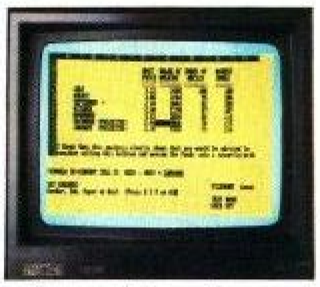
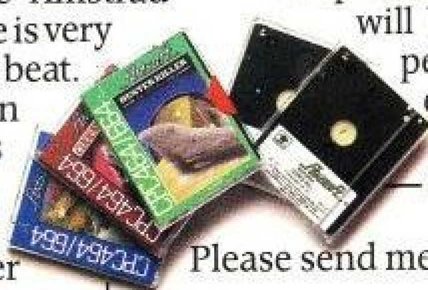


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```
: USELESS <BUILDS ." This is BUILDING"
          DOES>   ." This is DOING"  ;
```

If you refer to Figure 3, you can see how the word USELESS is complied into the dictionary. In fact, it is compiled just like any other DO-COLON word. You can now use USELESS to compile new words into the dictionary. For example:

```
USELESS NEW-WORD
```

If you type this in, then NEW-WORD is compiled into the dictionary. The message 'This is BUILDING' is printed at compile time, as this is the building part of USELESS. If you now type NEW-WORD and press [ENTER] the 'doing' part will print the message 'This is DOING'.

Figure 3 shows how NEW-WORD is compiled into the dictionary. The PFA 'points' to the list of operations to be performed in the DOES> part of the defining word that created NEW-WORD - in this case USELESS. At run time, the PFA of NEW-WORD is also put onto the stack by the DOES> routine. This is useful, as we shall now see by looking at a more useful example of <BUILDS and DOES>.

FIGURE 3

USELESS

```
       LFA
       CFA       5821               DO-COLON routine.
       PFA       6995               <BUILDS routine.
                 7166               (.") Print-string routine.
                   17               length of string to print.
           THIS IS BUILDING         the string to print.
                 7011               DOES> routine.

     NEW-WORD
       LFA
       CFA       7023               DOES> routine.
       PFA        ???               Points to define time DOES>
```

The new defining word is called FIX and works exactly the same as the CONSTANT word. It is created by:

```
: FIX <BUILDS ,
      DOES> @ ;
```

Look at the building part of this word first. , (comma) is a FORTH word that takes the value presently on TOS and places it in the next available dictionary space. The doing part @ (at) replaces the address that is on TOS by the 16 bit value stored at that address. So if you now use this new defining word FIX thus:

```
12 FIX DOZEN
```

....FIX compiles the new word DOZEN into the dictionary. At compile time, the building part takes the value that is TOS (12) and places it in the PFA of DOZEN. When the word DOZEN is used the doing part places the PFA of DOZEN on TOS, and the @ puts the value stored in the PFA of DOZEN on TOS (12). You can now see how the CONSTANT word was created, as this works in exactly the same way.

The defining word VARIABLE would be created by:

```
: VARIABLE <BUILDS ,
           DOES>  ;
```

This is nearly the same as CONSTANT or FIX except that the 'at' word @ is omitted from the DOES> part. So if you enter:

```
0 VARIABLE SCORE
```

....the <BUILD part compiles the new word SCORE, the , (comma) word takes the value 0 and places it in the PFA of SCORE. At run time SCORE will simply just place the address of the PFA onto the stack, as no operations are specified by the DOES> part.

Remember that VARIABLE and CONSTANT work on 2 byte integers. Using <BUILDS and DOES>, it is possible to create 1 byte, 4 byte, and indeed any number of bytes to hold variables and constants. For example:

```
: CVARIABLE <BUILDS 0 C,
            DOES>  ;
```

CVARIABLE will create single byte variables, similar to the PASCAL CHAR. The building part takes the value of 0, and the word C, (store single byte) will set the word compiled by CVARIABLE to zero. The doing part is the same as for VARIABLE. So if you say:

```
CVARIABLE SMALL
```

....the variable SMALL is created, and is initialised to zero. To change the value in SMALL you would enter:

```
56 SMALL C!
```

The word C! stores a single byte to the variable SMALL. Be careful here -using ! instead of C! would probably corrupt part of the dictionary! To return the value in SMALL to the TOS you would say:

```
SMALL C@
```

The word C@ like C! works on just a single byte.

Variables and constants that work with double numbers (4 bytes) are easily created with the use of <BUILDS and DOES>. Listing 2 shows how this is done, together with some other words which can be used with them. The word ? (question mark) will print the contents of the address that is on TOS - it is therefore equivalent to @ . (at print). This prints a two byte value. C? will print a single byte - equivalent to a BASIC PEEK, and D? will print a double number held in four bytes. D@ will replace the address on the TOS by the double number store at that address. D! will store the double number given, to the address that is on TOS. DVARIABLE will therefore allow you to create variables that will hold double length numbers - these being initialised to zero when they are compiled. DCONSTANT will allow you to create four byte constants. Some of these words may already be in your FORTH dictionary under different names 2VARIABLE and 2CONSTANT for example. However, they are not part of my pre-release version, so they are included here as examples.

To store a large number - say 154274635 to the variable 'BIG' use:

```
DVARIABLE BIG
```

....to first compile the word BIG and to initialise it to zero, then:

```
154274635. BIG D!
```

....to store 154274635 to the 'double' variable BIG.

Note that a double number ends with a decimal point - in fact, the point can appear anywhere in the number if you like, although the number is not actually altered. The decimal point signals that the number is a double number, regardless of where it is positioned.

DCONSTANT would be used as follows:

```
12345678. DCONSTANT BIG-NUMBER
```

Entering BIG-NUMBER would then place the double length number on TOS and the value could be printed out by using D. (D-print)

To help you study the FORTH dictionary in more detail, the new word LIST-WORD is shown in listing 1. This works similar to VLIST only the words are displayed in a more orderly fashion and are followed by the NFA of the word, the PFA of the word, and finally the address that the CFA 'points' to. The address given here will reveal the 'type' of word. On my version, the address 5821 shows that the word is a DO-COLON word. A large proportion of the FORTH words are DO-COLON words as you will see. 7023 indicates a VOCABULARY or <BUILDS defining word, 5887 a CONSTANT, 5913 a VARIABLE, and 5931 a USER variable. Where the address is the same as the PFA, this indicates that the word is a 'machine code' word. In other words, the parameter block of the word contains actual Z80 machine code which is executed when the word is run. And yes! machine code routines are easily handled in FORTH, to give the sort of flexibility not often found in other languages. By using LIST-WORD and the word PEEK (see second article), you can study the FORTH dictionary, and even try to disassemble it, which will give you a great insight into the language. One point to bear in mind when using LIST-WORD is that to list the words in other vocabularies (e.g. EDITOR, ASSEMBLER) then you need to enter the vocabulary name, followed by the word DEFINITIONS i.e. EDITOR DEFINITIONS. Remember to set the context back to FORTH with FORTH DEFINITIONS, otherwise any new words that you create will be placed into the EDITOR vocabulary.

You may have found this months article rather 'heavy' going and you will probably need to study it several times to digest it. The end result, hopefully, will be well worth the effort.

LISTING

Lists WORD NAME....NFA....CFA....PFA

```
: ZERO 0= IF ." End of Dictionary " QUIT ENDIF ;

: KEYCLS KEY CR 13 =              ( check for [ENTER] key  )
   IF  SP! QUIT ENDIF CLS  ;      ( if so....QUIT else CLS )

: PRINT-OUT  24 1 DO              ( 24 lines per screen    )
  DUP DUP ID.                     ( print out word name    )
  15 I LOCATE 5 .R                ( prints NFA address     )
  PFA DUP DUP                     ( get the PFA address    )
  25 I LOCATE 5 .R                ( and print the PFA      )
  35 I LOCATE CFA @ 5 .R          ( get and print CFA      )
  CR LFA @ DUP                    ( get LFA of next word   )
  ZERO? LOOP ;                    ( any more words?        )

: LIST-WORD CLS LATEST            ( get NFA of last word   )
  BEGIN PRINT-OUT CR              ( print out one page     )

  ." Press any key to continue...[ENTER to ABORT"
  KEYCLS AGAIN ;                  ( CLS and repeat again   )
```

LISTING 2

```
: C? C@ . ;
: D@ DUP 2+ @ SWAP @ ;
: D! DUP 2+ SWAP ROT SWAPT ! ! ;
: D? D@ D. ;
: DVARIABLE <BUILDS 0 , 0 , DOES> ;
: DCONSTANT <BUILDS , , DOES> D@ ;
```

BASIC DATA STRUCTURES

People who write their own computer programs are usually well aware of 'algorithms' - the logical sequence of steps needed to make a program work -but often miss out on an equally important aspect of programming -data structures.

This short series of articles sets out to put the record straight and explain just what data structures are and how important an understanding of them is to your programming skills.

The computer programmer tends to see 'data' as being either structured or unstructured. Unstructured data usually means isolated pieces of data stored in variables. Each piece of data is treated in complete isolation from other pieces of data. In real life, however, we are used to structuring our data about the world. A telephone directory, for example is full of data, but the data is grouped with a recognisable structure. Every entry consists of a name, an associated address, and a telephone number.

Every entry in a telephone directory is what programmers call a 'record' and each record contains several 'fields'. In our telephone directory example, the fields are: NAME, ADDRESS, and TELEPHONE NUMBER. The programmer calls the whole set of records (i.e. the whole directory) a file.

Before looking at data structures in programming languages such as BASIC or Pascal, let's consider another example of a record-type data structure. Think of all the friends you know and the different types of data involved in each friend's 'record'. You undoubtedly know their forenames, probably their surnames, probably their telephone numbers, and certainly their sex. Furthermore, you possibly know their ages, you may know their jobs and might even know their salaries. If we look at these data 'fields' with a programmer's eye, we'll see that the data is of various different types. the NAME and FORENAME fields will be alphabetic characters. The TELEPHONE NUMBER field will be numeric data (different programming languages have different ways of treating numeric data, and there are several different number types - but we'll come to that later). SEX is yet another type of data, capable of taking only one of two possible values. A variable of this type is known as Boolean (named after the English mathematician George Boole). Boolean be either 'true' or 'false'. It may seem strange that a variable such as SEX could be either 'true' or 'false', but in Boolean logic, the values true and false are arbitrary. If, instead, we called the variable MALE, then MALE = TRUE or MALE = FALSE makes more sense.

The data about a person's job, in a computer program at least, would be considered as string-type data (in a language such as BASIC), while the person's salary would obviously be some type of numeric data.

You might think that these classifications of data into different types are purely arbitrary, for the convenience of the computer. And yet people do mentally classify data into different types, and structure it in different ways. We have already considered the RECORD, composed of FIELDS, each field being of one or more data TYPES. Records are organised into FILES, and this data structure too, is a familiar 'human' one. There are others. Consider SETS. A set is a collection of data objects of the same type. If PACK is set of objects of type CARD, then an object of type CARD may or may not be a member of the set PACK. The 67 of Hearts might be a valid CARD in some obscure card game, but it would not be a member of PACK if PACK were defined as the set of standard playing cards.

Defining sets

A set is defined as a specified group of objects, all of a specified type. A language such as Pascal, which allows you declare records and sets explicitly, would allow you to do the following:

```
TYPE

COMPONENTS = (TTL-CHIPS, PCBS, TRANSISTORS, NUTS,
             BOLTS, WIRE, CONNECTORS, RAM, ROM,
             RESISTORS, CAPACITORS, XTALS, SOCKETS);
```

We could then define a set type as:

```
TYPE

CIRCUIT = SET OF COMPONENTS;
```

Variables of type CIRCUIT can then be declared in the usual way, e.g:

```
VAR
    MEMORY-BOARD, CPU-BOARD, I/O-BOARD : CIRCUIT;
```

Data Structures and BASIC

The main point of this series is to show how structured data can be used within BASIC programs, so the examples given above may seem a little out of place. The point is this: human beings have an almost infinite capacity of organising simple (scalar) types of data into large and complex data structures, where each data structure can be thought of as a single object. We can easily think of DOCUMENTS, composed of PAGES, composed of PARAGRAPHS, composed of SENTENCES, composed of WORDS, composed of CHARACTERS. This makes it easy to think of the document 'letter-to-mum' as a single entity, discrete from document 'letter-to bank-manager'. We can deal with the DOCUMENT object as a whole, For example, we can erase it, print it or edit it.

Individual programming languages, however, differ greatly in their innate ability to deal with structured data. One of the best is Pascal. BASIC, by comparison, is very primitive. Pascal allows the programmer to create data structures of considerable complexity and to deal with them as individual entities. BASIC does not. This series, however, is aimed primarily at the BASIC programmer, so we will look at the various techniques that can be used in BASIC to simulate data structures. First, we will look at the fundamental tools that BASIC does provide.

BASIC variables

BASIC recognises only three data structures: variables, arrays and files. A simple (BASIC) variable may be of one of the following types:

INTEGER variables

REAL variables

INTEGER variables are a numeric type that can be any whole number (no decimal fractions) between -32768 and +32767.

Integers are useful for counting (GOES% in a game, for example, or SCORES%) or as indexes in loops where the loop must repeat a specified number of times. They are not very useful in arithmetic, where large or fractional results are involved.

REAL numbers are numbers such as the value of PI, or the amount left in your bank balance at the end of the month. The BASIC in your CPC464 can handle real numbers ranging from 2.9×10^{-39} to $1.7 \times 10^{+38}$. This range is huge enough for most types of mathematical work, but you must bear the limits in mind if your program involves much 'number crunching'.

STRING variables are used to store alphanumeric characters, including digits.

Examples of simple variables in Amstrad BASIC are:

```
100 SCORE% = SCORE% + 1
110 REM % INDICATES AN INTEGER VARIABLE
120 VOLUME! = AREA! * HEIGHT!
130 REM ! INDICATES A REAL NUMBER
140 BEST$ = "CPC464"
150 REM $ INDICATES A STRING VARIABLE - THE STRING
160 REM BEING ENCLOSED IN DOUBLE QUOTES
```

BASIC interpreters, even those as good as the one with your CPC464, do not recognise any other 'types' of data. You cannot, for example, declare a constant (such as WEEK = 7) that cannot be changed during the execution of the program. Naturally, you could easily include a statement such as WEEK = 7, but later in the program you could just as easily put in WEEK = 3, thereby changing the value of WEEK

In addition to having very few pre-defined data types, BASIC does not allow you to declare (invent) your own data types. In Pascal, you could do this:

```
CONST

   WEEK = 7;

TYPE

   DAY = (MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY,
         SATURDAY, SUNDAY);

VAR

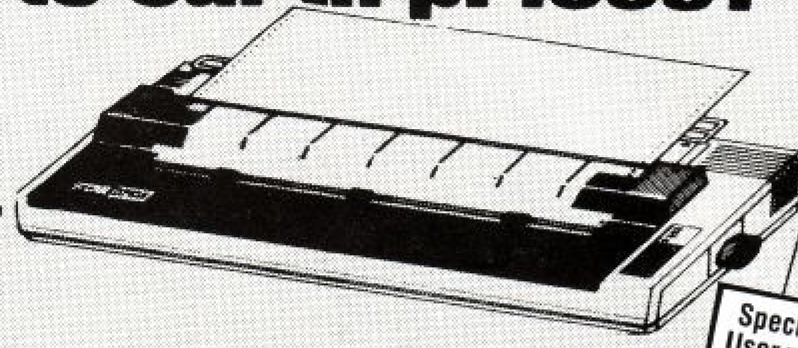
   HOLIDAY, HALFDAY : DAY
```

This Pascal program fragment has created a constant called WEEK that has an unchanging value of 7, a data type called DAY that can have any of the values listed within the brackets, and two variables called HOLIDAY and HALFDAY that are both of the type DAY. This means that the Pascal statement HOLIDAY := WEDNESDAY would be a legal statement, but HOLIDAY := 14 would not be permitted (:= is used in Pascal for assigning values to variables, and is equivalent to the = in BASIC variable assignments, e.g. x=10).

In this instalment, we have looked very briefly as some of the basics of data structures and data types. Next time we will look at two structures that BASIC does allow - arrays and files - and touch upon ways of simulating structures such as records.

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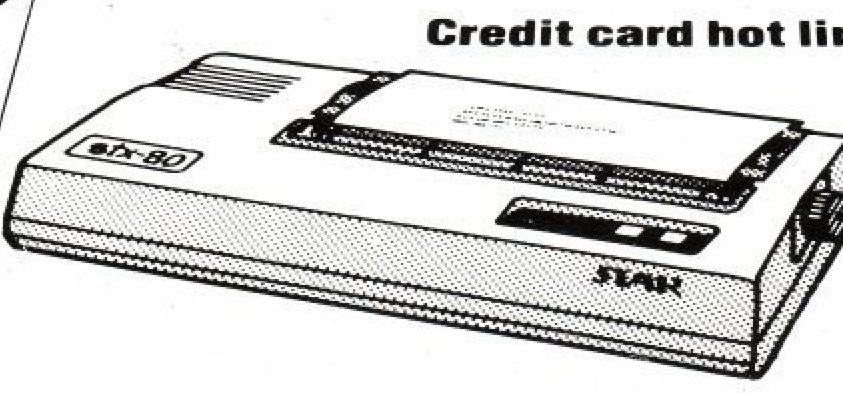
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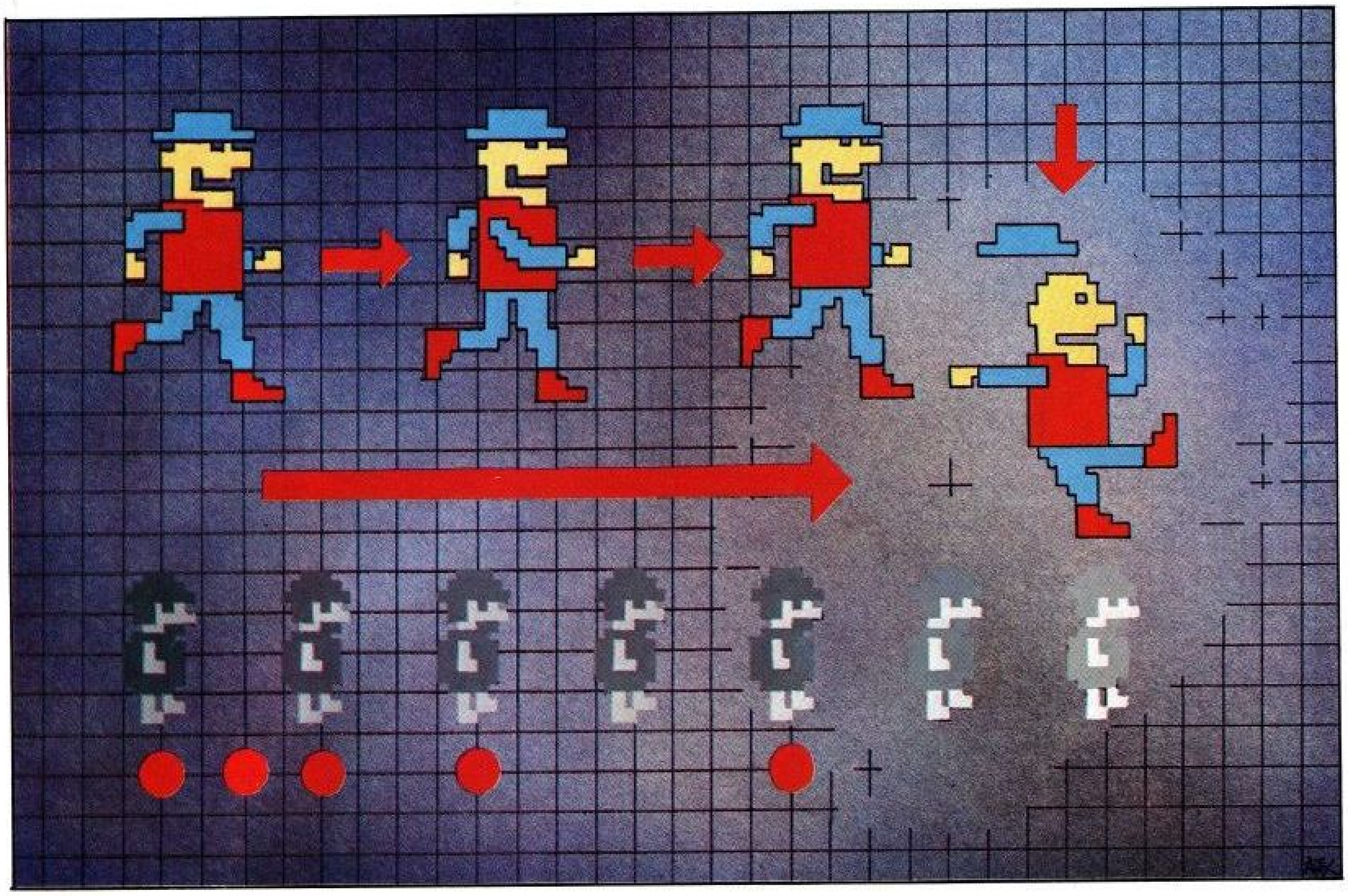
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BEGINNING MACHINE CODE 3: COLLISION DETECTION

P. K. McBride

Collision detection isn't just about hitting things, although that is the focus of this article; it is about all those situations where images might come into contact with each other: Roland dodging the dangers, racing cars crashing into each other or the side of the track, or golf balls going into holes. Two different ways of testing for collisions are covered here, in the context of a very simple 'invader' game.

Of course there is more to this kind of game than just collision detection; missiles have to be fired, bombs dropped, and the program needs to handle the several routines which manage the different images. It can get rather complicated, so to keep things simple I have pared down the game to an absolute minimum. It is written as a series of routines, each of which can be expanded when you have got the hang of it all.

The game uses four images - target, bomb, gun and missile. The target, an alien craft, drifts across the screen dropping bombs at regular intervals. The gun is fixed on the bottom line, but can move left or right under key controls - the left/right cursor arrows are used. Pressing the copy key fires a missile up at the invader.

Essential data about the images is stored in a block at the start of reserved memory (40960 to 40974).

```
40960 0,160  Target x co-ordinate (low byte,high
                  byte)
40962 2,160  Gun x co-ordinate
40964 4,160  Missile control flag
40965 5,160  Missile x co-ordinate
40967 7,160  Missile y co-ordinate
40969 9,160  Bomb control flag
40970 10,160  Bomb x co-ordinate
40972 12,160  Bomb y co-ordinate
40974 14,160  Score
```

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The 'missile control flag' can have three possible values: 0 shows that no missiles are active; 1 indicates a missile in flight; and 2 tells the computer that one has just been fired. The 'bomb control flag' is simpler; it is either 0 or 1, for if a bomb is not dropping at any time, then the next will be released immediately.

The program revolves around a single loop which calls up the different routines in turn to move the four images. Within this main loop is an escape hatch -pressing ESCAPE gets you back to BASIC.

```
loop: CALL target
      LD A,(40964)        Missile control flag
      CP 0
      CALL NZ,missile
      CALL bomb
      LD A,66             ESCAPE key code
      CALL &BB1E          KM TEST KEY
      JR NZ,exit
      CALL keys           check controls
      JR loop
```

Don't miss out the CALLs if you haven't written the sub-routines; replace them with '0,0,0' instead. This will keep all the rest of the addresses right.

All movement routines follow the same pattern. Co-ordinates are read in from the data block (except for the unchanging y co-ordinates of the target and the gun); the image is over-printed, which wipes it out in the XOR screen mode used here. The new position is calculated and checked for legality, and if it is still within its limits, is reprinted.

When the target hits the edge of the screen, it is 'wrapped round' to reappear on the left hand side. The ORIGIN has been offset 32 pixels to allow it to slide into view. (You may notice a distinct slowing down when the target is only partly visible. This is the ROM routine coping with off-screen printing.)

The gun is treated differently; it is forced to stop at the edges, and attempts to move it beyond the limits are ignored.

When the missiles are first set into motion, the program copies the x co-ordinate of the gun into the missile. The bomb takes its startpoint from the alien in the same way.

Collision detection is handled in two ways, by reading the screen and by comparing co-ordinates.

There are three ROM calls that can read the screen.

TXT RD CHAR (&BB60) will return in A the code of the character at the current cursor position. This will only work with characters in the standard print grid, and the cursor must be positioned first with the TXT SET CURSOR call (&BB75).

GRA TEST ABSOLUTE (&BBF0) tells you the ink at a specified point on the screen. The co-ordinates of the point are given in DE (x) and HL (y), and the ink number is returned in A. BC, DE and HL are corrupted by the call. If A contains zero, then the screen is background at that point. This routine is used in the example program to detect a hit on an invader. It tests the screen at the point where the missile is about to be printed, and counts the presence of ink 1 as a hit. As all printing is done in ink 1, this means that a collision with a bomb would also count as a hit on the ship! More accurate targetting can be easily obtained by printing the alien in ink 2, and checking for that. It is only a matter of changing the graphics ink as you move in and out of the print-target routine. GRA SET PEN (&BBDE) will change the current graphics ink. Load A with the number before the ROM call. Only AF is corrupted; the other registers are unaffected.

GRA TEST RELATIVE (&BBF3) is a variation on the other TEST call. To use this, DE must be loaded with the signed x offset, and HL with the y offset. The ink number is again returned in A.

Co-ordinate comparison is used by the program's hit-gun routine. Where the standard print grid is used, it is a fairly simple matter to compare the co-ordinates of two images. Either they are the same, or they are not. With characters displayed by GRA WR CHAR, the problem is more complex. Now you have to check that the co-ordinates are close enough for the images to overlap. In Basic, you can do this by using the ABS command: 'IF ABS (xgun-xbomb) < 16 THEN.....'. Unfortunately, there is no ABS in code!

The hit-gun routine is called into play when a bomb reaches the bottom line. As the gun is also on the bottom line, there is no need to compare the y co-ordinates. On entry, DE contains the x co-ordinate of the bomb. The x co-ordinate of the gun is then read in from the data block, and the difference between the two is found by subtraction. The HL register must then be checked byte by byte to see if it contains less than 8 (H=0, L<8) or than -8 (H=255, L>247).

```
hitgun   LD HL (40962)     gun co-ordinate
         SBC HL,DE         find difference
         LD A,H            check H for 0
         CP 0
         JR NZ, minus
         LD A,L            check L for <8
         CP 8
         RET NC            carry not set - L >=8
         JR boom
minus    CP 255            (A still contains H)
         RET C             carry set, H out of range
         LD A,L            check L for > -8
         CP 247
         RET C             carry set, L <247 i.e. L > -8
```

Clearly, it is simpler and quicker to TEST the screen, but there may be occasions when that is not possible, and routines like this will have to be used instead.

When you key in the game, take it from the top down, a section at a time, and get the bugs out of each new one before moving onto the next. Start with the main loop, the print-gun, target, and print-target routines, but do create the data block at the beginning, even though you won't use all of it at first, and any CALLs or jump instructions that can't be activated immediately, should be replaced with 0's (NOP - No Operation), so that relative jumps and sub-routine addresses remain the same.

After it is all keyed in and working, try designing your own sprite games, combining the techniques used here, with those from the last two articles, so that you have lots of sprites, colour and movement. You will find that the results surpass anything you could write in BASIC, though for a really professional gloss, you will have to tackle the mysteries of interrupt handling to get rid of the final flickers.

Assembler Listing

routine	code	assembler	notes
XOR	62,1	LD A,1	1=XOR mode
	205,89,188	CALL &BD59	SCR ACCESS
start	17,64,1	LD DE 64,1	get x co-ord. before printing
	205,60,160	CALL pr.gun	subroutine to print
loop	205,72,160	CALL target	
	58,4,160	LD A,(40964)	get missile control flag
	254,0	CP 0	and check it
	196,120,160	CALL NZ,41080	missile routine if active
	205,111,161	CALL bomb	
	62,66	LD A,66	code for ESC key
	205,30,187	CALL &BB1E	KM TEST KEY
	32,5	JR NZ,exit	Zero set if not pressed
	205,9,161	CALL keys	check controls
	24,230	JR loop	end of main loop
exit	62,0	LD A,0	0=normal print mode
	205,89,188	CALL &BD59	SCR ACCESS
	201	RET	RETurn to BASIC
	0,0	NOP,NOP	spacers
pr.gun	33,32,0	LD HL,32,0	set y co-ord. to bottom line
	205,192,187	CALL &BBC0	GRA MOVE ABSOLUTE
	62,244	LD A,244	character code
	205,252,187	CALL &BBFC	GRA WR CHAR
	201	RET	RETurn from sub-routine
target	237,91,0,160	LD DE (40960)	target x co-ord.
	33,0,1	LD HL,0,1	y co-ord.
	229	PUSH HL	stack for safe-keeping
	213	PUSH DE	
	205,111,160	CALL pr.targ	subroutine to print
	209	POP DE	
	225	POP HL	
	19	INC DE	number of INCs fixes..
	19	INC DE	speed of movement
	19	INC DE	
	19	INC DE	
	122	LD A,D	check position
	254,2	CP 2	
	56,8	JR C,tar.y	still legal - store y co-ord
	123	LD A,E	
	254,192	CP 192	right edge of screen
	56,3	JR C, tar.y	still legal
	17,0,0	LD DE,0,0	off edge. reset y
tar.y	237,83,0,160	LD (40960),DE	store new y co-ord.
	205,111,160	CALL pr.tar	subroutine to print
	201	RET	RETurn to main loop
pr.tar	205,192,187	CALL &BBC0	GRA MOVE ABSOLUTE
	62,226	LD A,266	character code
	205,252,187	CALL &BBFC	GRA WR CHAR
	201	RET	REturn to target routine
missile	237,91,5,160	LD DE,(40965)	missile x co-ordinate
	42,7,160	LD HL,(40967)	missile y
	254,2	CP 2	A contains control flag
	32,15	JR NZ,moving	already in flight
setoff	237,91,2,160	LD DE,(40962)	x co-ord of gun
	237,83,5,160	LD (40965),DE	pass value to missile
	62,1	LD A,1	indicate 'in flight'
	50,4,160	LD (40964),A	reset control flag
	24,46	JR out	
moving	213	PUSH DE	
	229	PUSH HL	note order in stack
	205,0,161	CALL pr.miss	subroutine to print missile
	225	POP HL	
	6,8	LD B,8	number fixes speed of flight
inc	35	INC HL	move up a pixel
	16,253	DJNZ inc	
	34,7,160	LD (40967),HL	store new y co-ord.
	229	PUSH HL	
	6,16	LD B,16	pull DE across to middle of..
adjust	27	DEC DE	character square before ..
	16,253	DJNZ adjust	TESTing pixel
	205,240,187	CALL &BBF0	GRA TEST ABSOLUTE
	225	POP HL	
	209	POP DE	reclaim original x value
	254,1	CP 1	value of A after TEST?
	40,21	JR Z,hit	
	124	LD A,H	check y co-ord
	254,1	CP 1	
	56,12	JR C,out	carry set - y too high
	62,0	LD A,0	turn missile off
	50,4,160	LD (40964),A	
	33,64,0	LD HL,64,0	reset missile y for next shot
	34,7,160	LD (40967),HL	
	201	RET	RETurn to main loop
out	205,0,161	CALL pr.miss	subroutine to print missile
	201	RET	RETurn to main loop
hit	62,0	LD A,0	
	50,4,160	LD (40964),A	reset missile control flag
	50,9,160	LD (40969),A	turn off bomb, if any
	33,64,0	LD HL,64,0	
	34,7,160	LD (40967),HL	reset missile y for next
	33,64,1	LD HL,64,1	
	34,2,160	LD (40962),HL	reset gun x
	33,0,0	LD HL,0,0	
	34,0,160	LD (40960),HL	reset target x
	58,14,160	LD A,(40974)	get score
	60	INC A	add one
	50,14,160	LD (40974),A	store new score
	245	PUSH AF	
	205,20,188	CALL &BC14	SCR CLEAR
	33,1,1	LD HL,1,1	row 1, column 1
	205,117,187	CALL &BB75	TXT SET CURSOR
	241	POP AF	
	71	LD B,A	number of hits
	197	PUSH BC	loop to display score
pr.hit	62,253	LD A,253	character code
	205,93,187	CALL &BB5D	TXT WR CHAR
	193	POP BC	
	16,247	DJNZpr,hit	
	195,20,160	JP start	start again after hit
	0,0,0	NOP's	spacers
pr.miss	205,192,187	CALL &BBC0	GRA MOVE ABSOLUTE
	62,145	LD A,145	character code
	205,252,187	CALL &BBFC	GRA WR CHAR
	201	RET	RETurn to missile
keys	62,9	LD A,9	COPY key
	205,30,187	CALL &BB1E	KM TEST KEY
	40,12	JR Z,left	Z if not down
	58,4,160	LD A,(40964)	missile control flag
	254,0	CP 0	
	192	RET NZ	RETurn if already set
	62,2	LD A,2	
	50,4,160	LD (40964),A	set flag to 2
	201	RET	RETurn to main loop
left	62,8	LD A,8	left arrow
	205,30,187	CALL &BB1E	KM TEST KEY
	40,35	JR Z,right	Z if not down
	237,91,2,160	LD DE,(40962)	gun x co-ord
	213	PUSH DE	
	205,60,160	CALL pr.gun	to erase it
	209	POP DE	
	6,8	LD B,8	
decgun	27	DEC DE	move to left
	16,253	DJNZ decgun	
	122	LD A,D	check x value
	254,0	CP 0	
	32,8	JR Z,outgun	in range
	123	LD A,E	
	254,64	CP 64	left limit
	48,3	JR NC,outgun	
	17,64,0	LD DE,64,0	reset gun x co-ord
outgun	237,83,2,160	LD (40962),DE	store new x
	205,60,160	CALL pr.gun	reprint gun
	201	RET	RETurn to main loop
right	62,1	LD A,1	right arrow code
	205,30,187	CALL &BB1E	KM TEST KEY
	200	RET Z	Z if not down
	237,91,2,160	LD DE,(40962)	gun x co-ord
	213	PUSH DE	
	205,60,160	CALL pr.gun	
	209	POP DE	
	6,8	LD B,8	
incgun	19	INC DE	move right
	16,253	DJNZ incgun	
	122	LD A,D	check x value
	254,2	CP 2	
	56,8	JR C,out2	carry set, x low
	123	LD A,E	
	254,128	CP 128	right limit
	56,3	JR C,out2	
	17,128,2	LD DE,128,2	reset x value
out2	237,83,2,160	LD (40962),DE	store new x
	205,60,160	CALL pr.gun	
	201	RET	RETurn to main loop
bomb	58,9,160	LD A,(40969)	bomb control flag
	254,0	CP 0	
	32,18	JR NZ,active	1 if already dropping

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routine	code	assembler	notes
	62,1	LD A,1	
	50,9,160	LD (40969),A	reset flag
	33,240,0	LD HL,240,0	bomb y co-ord
	237,91,0,160	LD DE,(40960)	plane x co-ord
	237,83,10,160	LD (40970),DE	transfer x value to bomb
	24,24	JR pr.bomb	routine to print bomb
active	237,91,10,160	LD DE,(40970)	bomb x co-ord
	42,12,160	LD HL,(40972)	bomb y co-ord
	213	PUSH DE	
	229	PUSH HL	
	205,160,161	CALL pr.bomb	
	225	POP HL	
	17,8,0	LD DE,8,0	bomb's height adjusted by
	237,82	SBC HL,DE	subtraction
	209	POP DE	reclaim x co-ord
	125	LD A,L	check height-always under 256
	254,32	CP 32	bottom line?
	56,12	JR C,hitgun	carry set - reached bottom
pr.bomb	34,12,160	LD (40972),HL	store bomb y co-ord
	205,192,187	CALL &BBC0	GRA MOVE ABSOLUTE
	62,252	LD A,252	character code
	205,252,187	CALL &BBFC	GRA WR CHAR
	201	RET	RETurn -to main loop/bomb s.r.
hitgun	62,0	LD A,0	
	50,9,160	LD (40969),A	reset bomb control flag
	42,2,160	LD HL,(40962)	gun x co-ord
	237,82	SBC HL,DE	DE holds bomb x co-ord
	124	LD A,H	check result
	254,0	CP 0	positive small number?
	32,6	JR NZ,minus	
	125	LD A,L	
	254,8	CP 8	close enough?
	208	RET NC	RETurn if 8 or more
	24,7	JR,boom	otherwise boom
minus	254,255	CP 255	A contains H value
	216	RET C	RETurn if less
	125	LD A,L	
	254,247	CP 247	small negative number
	216	RET C	RETurn if not
boom	33,25,8	LD HL,25,8	middle of bottom line
	205,117,187	CALL &BB75	TXT SET CURSOR
	62,66	LD A,66	'B'
	205,93,187	CALL &BB5D	TXT WR CHAR
	62,79	LD A,79	'O'
	205,93,187	CALL &BB5D	TXT WR CHAR
	62,79	LD A,79	'O'
	205,93,187	CALL &BB5D	TXT WR CHAR
	62,77	LD A,77	'M'
	205,93,187	CALL &BB5D	TXT WR CHAR
	1,0,128	LD B,0,128	set up delay time
delay	11	DEC BC	
	120	LD A,B	
	177	OR C	
	32,251	JR NZ,delay	
	33,25,8	LD HL,25,8	
	205,117,187	CALL &BB75	TXT SET CURSOR
	6,4	LD B,4	set to erase 'boom'
wipe	197	PUSH BC	
	62,32	LD A,32	code for space
	205,93,187	CALL &BB5D	TXT WR CHAR
	193	POP BC	
	16,247	DJNZ wipe	
	201	RET	RETurn to main loop

BASIC Loader Program.

```
10 'collision detection
20 ' P.K.McBride 1985
30 MEMORY 40959
40 'x sum=54284: a=41468
50 a=40960
60 x=0: ' used for checksum. Remove this & x=
   x+b in next line when program o.k.
70 READ b:IF b<>999 THEN POKE a,b:a=a+1:x=x+b
   :GOTO 70
80 ' data block
90 DATA 0,0,64,1,0,0,0,64,0,0,0,0,224,0,0
100 ' set XOR print mode
110 DATA 62,1,205,89,188
120 ' main loop
130 DATA 17,64,1,205,60,160,205,72,160,58,4,1
    60,254,0,196,120,160
140 DATA 205,111,161,62,66,205,30,187,32,5,20
    5,9,161,24,230
150 ' exit - reset normal print mode
160 DATA 62,0,205,89,188,201,0,0
170 ' print gun
180 DATA 33,32,0,205,192,187,62,244,205,252,1
    87,201
190 ' target handling subroutine
200 DATA 237,91,0,160,33,0,1,229,213,205,111,
    160,209,225,19,19,19,19,122,254,2,56,8
210 DATA 123,254,192,56,3,17,0,0,237,83,0,160
    ,205,111,160,201
220 'print  target
230 DATA 205,192,187,62,226,205,252,187,201
240 ' missile handler
250 DATA 237,91,5,160,42,7,160,254,2,32,15,23
    7,91,2,160,237,83,5,160,62,1,50,4,160,24,
    46
260 DATA 213,229,205,0,161,225,6,8,35,16,253,
    34,7,160,229,6,16,27,16,253,205,240,187,2
    25,209
270 DATA 254,1,40,21,124,254,1,56,12,62,0,50,
    4,160,33,64,0,34,7,160,201,205,0,161,201
280 'reset data block after hit
290 DATA 62,0,50,4,160,50,9,160,33,64,0,34,7,
    160,33,64,1,34,2,160,33,0,0,34,0,160,58,1
    4,160,60,50,14,160
300 DATA 245,205,20,188,33,1,1,205,117,187,24
    1,71,197,62,253,205,93,187,193,16,247,195
    ,20,160,0,0,0
310 ' print missile
320 DATA 205,192,187,62,145,205,252,187,201
330 ' control keys - fire?
340 DATA 62,9,205,30,187,40,12,58,4,160,254,0
    ,192,62,2,50,4,160,201
350 ' move left?
360 DATA 62,8,205,30,187,40,35,237,91,2,160,2
    13,205,60,160,209,6,8,27,16,253,122,254,0
    ,32,8,123,254,64,48,3,17,64,0,237,83,2,16
    0,205,60,160,201
370 ' move right?
380 DATA 62,1,205,30,187,200,237,91,2,160,213
    ,205,60,160,209,6,8,19,16,253,122,254,2,5
    6,8,123,254,128,56,3,17,128,2,237,83,2,16
    0,205,60,160,201
390 ' bomb routine
400 DATA 58,9,160,254,0,32,18,62,1,50,9,160,3
    3,240,0,237,91,0,160,237,83,10,160,24,24
410 DATA 237,91,10,160,42,12,160,213,229,205,
    160,161,225,17,8,0,237,82,209,125,254,32,
    56,12
420 ' store position and print bomb
430 DATA 34,12,160,205,192,187,62,252,205,252
    ,187,201
440 ' bomb at bottom line - hit?
450 DATA 62,0,50,9,160,42,2,160,237,82,124,25
    4,0,32,6,125,254,8,208,24,7,254,255,216,1
    25,254,247,216
460 ' boom message
470 DATA 33,25,8,205,117,187,62,66,205,93,187
    ,62,79,205,93,187,62,79,205,93,187,62,77,
    205,93,187
480 ' delay and erase message
490 DATA 1,0,128,11,120,177,32,251,33,25,8,20
    5,117,187,6,4,197,62,32,205,93,187,193,16
    ,247,201
500 DATA 999
510 STOP: 'check that x=54149, and that a=414
    68 after data read.REMOVE THIS LINE AFTER
     CHECKING
520 MODE 0
530 ORIGIN -64,0
540 CALL 40975
550 STOP
```

DATAC Printer Review

Reviewed by William Poel.

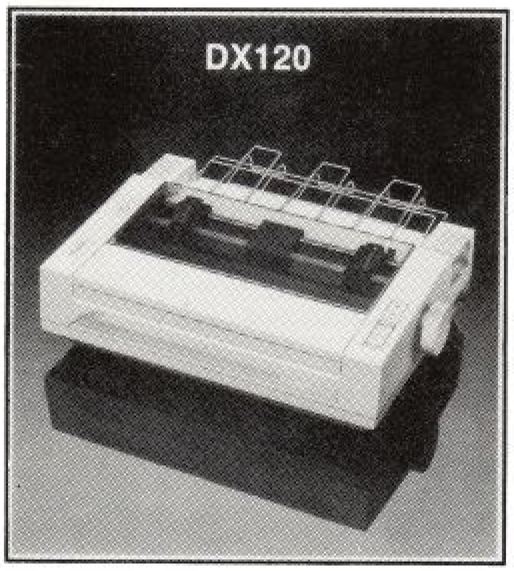
The search for the Top Bit

What, more printers? Well - err - yes: but the DATAC family have something rather useful to offer Amstrad owners.... the eighth bit! Read on.

There are a lot of printers on the market. Epson have tended to regard the dot-matrix market as their own private property, and have got a shade complacent and arrogant in the process. And yes, the writer finds some of the Epson publicity stuntery to be extraordinarily tasteless. Their presence on the awful Ultra Quiz put the public image of computing back at least 1000 years.

Brother have sneaked along with a very competent range and the new low cost standard in the shape of the M1009. Now Datac are having a crack at the same sector with a range of own-labelled equipment from the large Japanese manufacturer, National Panasonic. And from what we've seen of it so far, it is very good.

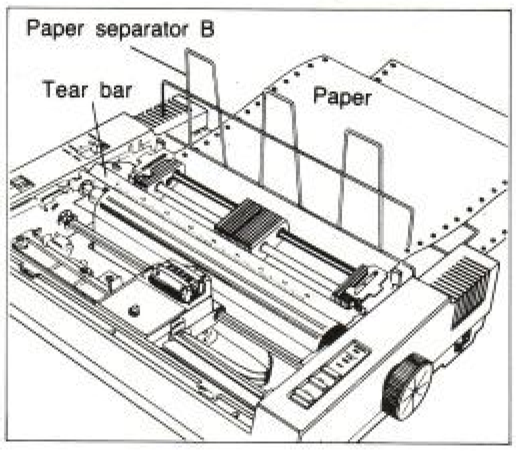
It needs to be to cope with the printer overpopulation of 1985.





Open the box....

No complaints with the DX120. Well packed, all there - including the obligatory transit screws. The manual - frequently grounds for some trepidation -bears all the hallmarks of actually having been proof read by a native English person for once. And a reasonably literate one at that.



The DX109 manual has yet to succumb to this treatment, and contains the usual desecration of the English language:

'As the registered character is printed out with the half-dot pitch, please avoid to register the font that uses the same pin in sucession....'

The DX120 is worth the extra for the comprehensible manual alone.

In fact, the DX120 manual is delightful, and deserves to be regarded as the standard by which all others should be judged (I still prefer the Epson ones -Ed). We reproduce the superb line drawings here since this displays the multiple option paper feed system very concisely.

Features and functions

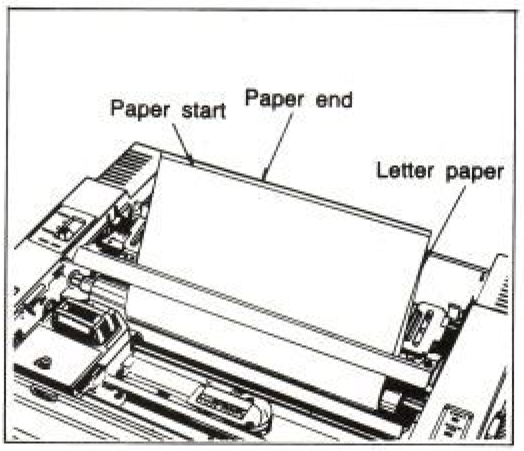
The DX120 (Panther II) is the top end model at £319 + VAT (£366.85) and does just about everything. It's appearance is perhaps a shade deceptive: the last printer I looked at that did all that the DX120 does cost over £1000 and was built along the lines of the proverbial exterior 'washroom'. Although sturdily constructed, the DX120 doesn't cause the table to sag in the fashion of a good old Centronics 700.

The Panther II has a very passable near letter quality (22cps) mode, proportional spacing, 120 cps 'draft mode' and IBM (who they?) graphics characters and compatibility.

The DX109V (Panther I) comes in at £278 + VAT (£319.70) and is pretty much a straight Epson compatible with 80 cps print speed.

The APLLE (sic) uses a 7-bit Centronics interface (we are not alone), so both printers can set the top bit using the ESC &3E &BC sequence.

Throughout the test the printer proved to be so good that Amstrad User bought one Panther II and a visiting manager from Amstrad customer services bought one for his department.



A Japanese Plot.

Just recently all the major typewriter/printer manufacturers seem to have introduced various combined typewriters and printers. Brother is perhaps the most notable -having several units currently available -unfortunately for CPC 464 users, they generally use an RS232 interface rather than Centronics and would therefore require an extra bit of electronics and software to be used with your Arnold. A further interesting development is the introduction of colour to these devices, which will obviously be of interest to users of a colour computer. Silver-Reeds new contender for this market will perhaps be the most interesting to Amstrad users.

In a slender ivory case (12.7" x 10.5" x 2.2") and weighing 5.5lbs, once you work out just which way to "PUSH" the lid to open it, the SILVER REED COLOUR PENGRAPH EB 50 is revealed as a neat little machine featuring 44 typewriter style keys plus function keys. Matt-black and shaped, they have a positive feel and are set at an angle which is comfortable in use. Above the standard layout, six calculator-style buttons on the left determine colour, print mode, line spacing, print style, size and direction whilst a bank on the right include six 'calculation keys' and four controlling print head movement and paper feed.



The EB 50 comes with a 58-page manual, clearly set out, mainly in pictorial fashion and there is a nice fold-out diagram of the complete layout of keys, switches etc. inside the front cover, with numbers in red indicating the page on which an explanation of their various functions can be found. Instructions assume that this is your first experience of this type of machine, taking you step by step through insertion of batteries, connection of power supply, setting of the four coloured ballpoint pens and paper injection to your first excercises in typing.

Ink colour can be chosen from black, red, blue or green; print style gives a four-way option of 'standard', 'standard underscore', 'italic' and 'italic underscore'. There are three sizes of print on offer:-

Large: 4.8mm (0.19 in.) 40 chrs per line
Medium: 2.4mm (0.09 in.) 80 chrs per line
Small: 1.2mm (0.05 in.) 160 chrs per line

Line spacing has four variations, and printing can be executed in three directions, though care needs to be taken with positioning when changing from one direction to another. However, this ability to print text down the page, as well as across, can be invaluable for labelling the axis of graphs and other diagrams.

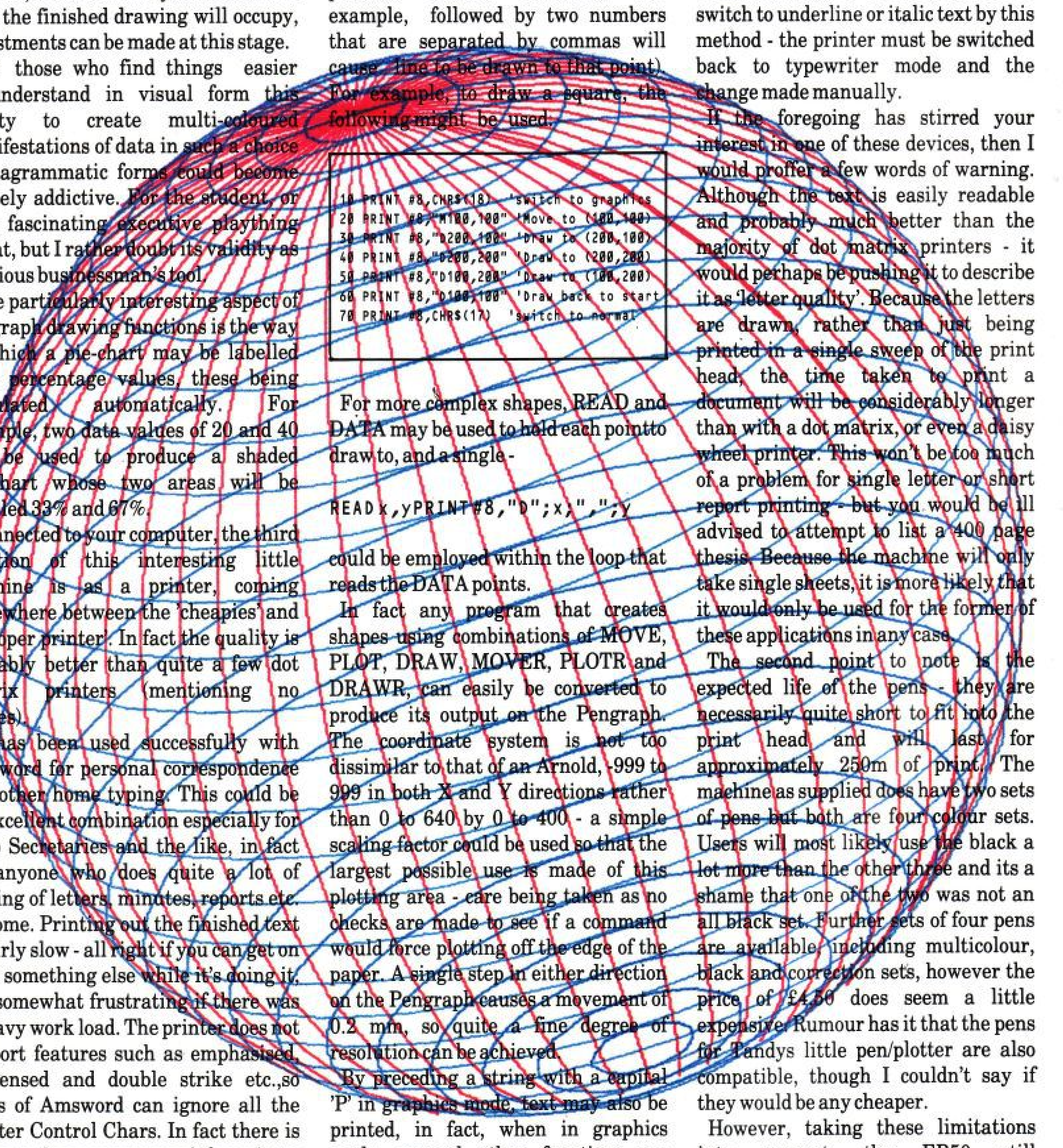
The current settings of all these options are shown by indicators in the LCD display, though on the machine it is sometimes difficult to see these unless they are viewed from exactly the right angle. A rotary control on the side of the typewriter allows the brightness of this display to be adjusted, so this may not be too great a problem.

There are three typing modes:- Direct to Paper (an optional extra set of pens is available to allow for corrections to be made on the paper in this mode), Correction Print, where alterations can be made to the text on the liquid crystal display before it is printed out, and a Non-Print mode for use with the calculator facility. (Though it is possible to have the results of any calculations printed - invaluable if you need to make a last minute calculation while composing a letter or invoice etc.

Print quality is clear and easy to read, though not comparable with that produced by more expensive machines, and you are limited to using single sheets of A4 paper - though it is just possible to print single address labels without too much hassle. I did find it a bit temperamental as regards paper quality - ordinary top copy typing paper failed to feed through correctly, producing increasingly sloping lines, but with Bond quality it is now working very successfully.

Of course, as its name suggests, the Pengraph is very much more than just


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a typewriter, offering the facility to draw eleven different types of pie, bar and line graph, and a (maximum) 12 x 12 table.

After the size and type of graph has been selected, and the data has been entered, a 'test' allows you to see what area the finished drawing will occupy, adjustments can be made at this stage.

For those who find things easier to understand in visual form this ability to create multi-coloured manifestations of data in such a choice of diagrammatic forms could become wholely addictive. For the student, or as a fascinating executive plaything -great, but I rather doubt its validity as a serious businessman's tool.

One particularly interesting aspect of the graph drawing functions is the way in which a pie-chart may be labelled with percentage values, these being calculated automatically. For example, two data values of 20 and 40 can be used to produce a shaded pie-chart whose two areas will be labelled 33% and 67%.

Connected to your computer, the third function of this interesting little machine is as a printer, coming somewhere between the 'cheapies' and a 'proper printer'. In fact the quality is probably better than quite a few dot matrix printers (mentioning no names).

It has been used successfully with Amsword for personal correspondence and other home typing. This could be an excellent combination especially for Club Secretaries and the like, in fact for anyone who does quite a lot of writing of letters, minutes, reports etc. at home. Printing out the finished text is fairly slow - all right if you can get on with something else while it's doing it, but somewhat frustrating if there was a heavy work load. The printer does not support features such as emphasised, condensed and double strike etc.,so users of Amsword can ignore all the Printer Control Chars. In fact there is only one 'escape sequence' the printer understands - to switch it into plotting mode.

The manual also includes some sample programs for drawing simple shapes - very helpful to the beginner -as long as you realise that our equivalent of LPRINT is PRINT #8.

PRINT #8,CHR$(18)

will switch the printer into graphics mode - instead of text appearing directly when sent to the printer, several special letters will cause it to perform various functions. (for example, followed by two numbers that are separated by commas will cause line to be drawn to that point). For example, to draw a square, the following might be used.

```
10 PRINT #8,CHR$(18)   'switch to graphics
20 PRINT #8,"M100,100" 'Move to (100,100)
30 PRINT #8,"D200,100" 'Draw to (200,100)
40 PRINT #8,"D200,200" 'Draw to (200,200)
50 PRINT #8,"D100,200" 'Draw to (100,200)
60 PRINT #8,"D100,100" 'Draw back to start
70 PRINT #8,CHR$(17)   'switch to normal
```

For more complex shapes, READ and DATA may be used to hold each pointto draw to, and a single -

```
READ x,yPRINT#8,"D";x;",";y
```

could be employed within the loop that reads the DATA points.

In fact any program that creates shapes using combinations of MOVE, PLOT, DRAW, MOVER, PLOTR and DRAWR, can easily be converted to produce its output on the Pengraph. The coordinate system is not too dissimilar to that of an Arnold, -999 to 999 in both X and Y directions rather than 0 to 640 by 0 to 400 - a simple scaling factor could be used so that the largest possible use is made of this plotting area - care being taken as no checks are made to see if a command would force plotting off the edge of the paper. A single step in either direction on the Pengraph causes a movement of 0.2 mm, so quite a fine degree of resolution can be achieved.

By preceding a string with a capital 'P' in graphics mode, text may also be printed, in fact, when in graphics mode, several other functions are available, that are not in normal text mode: the current pen colour may be changed, the size of text may also be changed, as may the orientation of the text - in fact upside down text is possible in this way, though it is not available when the Pengraph is used as a typewriter.

If the printer is used with Amsword, then several printer control characters can be set up to switch to graphics mode, change pen colour or text size, then switch back to text mode. Unfortunately, it is not possible to switch to underline or italic text by this method - the printer must be switched back to typewriter mode and the change made manually.

If the foregoing has stirred your interest in one of these devices, then I would proffer a few words of warning. Although the text is easily readable and probably much better than the majority of dot matrix printers - it would perhaps be pushing it to describe it as 'letter quality'. Because the letters are drawn, rather than just being printed in a single sweep of the print head, the time taken to print a document will be considerably longer than with a dot matrix, or even a daisy wheel printer. This won't be too much of a problem for single letter or short report printing - but you would be ill advised to attempt to list a 400 page thesis. Because the machine will only take single sheets, it is more likely that it would only be used for the former of these applications in any case.

The second point to note is the expected life of the pens - they are necessarily quite short to fit into the print head and will last for approximately 250m of print. The machine as supplied does have two sets of pens but both are four colour sets. Users will most likely use the black a lot more than the other three and its a shame that one of the two was not an all black set. Further sets of four pens are available, including multicolour, black and correction sets, however the price of £4.50 does seem a little expensive. Rumour has it that the pens for Tandys little pen/plotter are also compatible, though I couldn't say if they would be any cheaper.

However, taking these limitations into account, the EB50 still outperforms the greater majority of similarly priced printers, and for the same money you also gain the use of a quite reasonable portable electric typewriter with the inbuilt ability to present numeric data in an easily digestible form.

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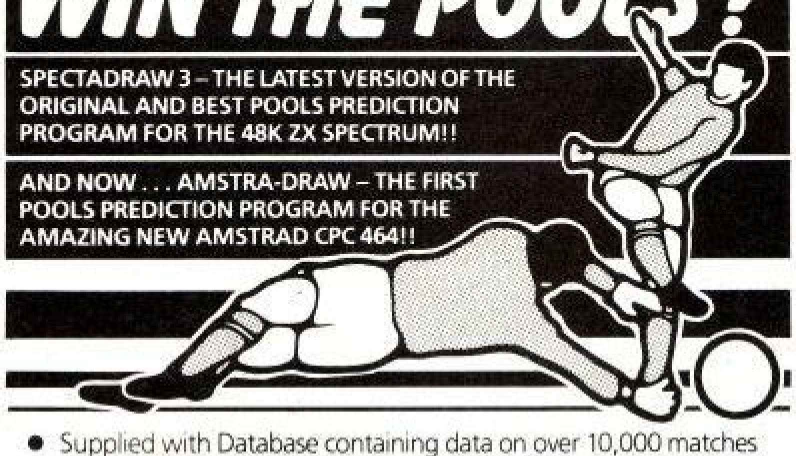
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Custom printing

Q: Having purchased the TASWORD 464 word processor I am delighted with its compatibility with the DMP1 printer in general use, (e.g. this letter) but I came unstuck when I attempted to use the PRINTER CONTROL CHARACTERS at the bottom of the 'Help' page.

After studying the TASWORD instruction book and referring to the DMP1 manual I have come to the conclusion that the DMP1 manual does not give enough information to 'customise' the TASWORD program, even to the extent of being able to underline words or paragraphs in the text.

I would be grateful for further information on the versatility of the DMP1 to customise my TASWORD program, therefore allowing me to utilise it to the full.

T.H.N.,
Gosport.

ACU: The Tasword word processing program was written to support most Epson compatible printers. Therefore you will only be able to implement the control functions supported by your individual printer.

With the DMP 1 you only have available the facility to double the size of the print.

Modem

Q: As a currently-isolated Micronet 800 member of PRESTEL I would be delighted to hear whether you have plans for a modem and support program and whether it is expected to have a large user-base through this medium?

P.A.B.,
Sheffield.

ACU: We get asked this question less frequently than expected, and as a result modem and serial interface projects have tended to sit on the back burner. Third party vendors are beginning to emerge (Protek for one) and we suggest you watch out for the adverts.

Serialised

Q: Thank you for the pile of leaflets, reprints etc. describing the CPC464.

I have ploughed through them all but from none could I find the answer to the question I sent to you -Is it possible to use a Brother EP44, as a printer on this machine?

Do you have a cable to match your Centronics parallel port to the RS232 of the Brother? Or does Amstrad have any plans to equip the CPC464 with an RS232 port?

This is the only detail unanswered which is preventing my immediate purchase of your excellent outfit.

ACU: It is possible to use any standard Centronics type printers with the CPC464. Amstrad will have an RS232 interface avaliable in July. Other third party vendors are just beginning to offer such products. Try:

KDS Electronics
15 Hill Street
Hunstanton
Norfolk
PE36 5BS

Break proof?

Q: Attempting to reset the machine with [CTRL] [SHIFT] [ESC] gives rise to *Break* but not a rebooting of the machine with Basic. Could you please advise whether this is a fault and I should return the machine for service or if there is an alternate way of rebooting.

N.H.,
Oxford.

ACU: The [CTRL] [SHIFT] [ESC] sequence should totally reset your computer. From your letter you appear only to be producing the [ESC] function.

The cause of this is either that you are pressing the [ESC] key first instead of all three keys together in the sequence [CTRL][SHIFT][ESC] - holding each key down as pressed, or that the [SHIFT] or [CTRL]

keys are not functioning correctly.

If problems persists, test the [CTRL] and [SHIFT] keys independently using one of the various KEY commands. If you find a fault, you should return the computer to your retailer for repair.

Doctor's Casebook

Q: I am considering buying an Amstrad CPC464 for word processing and some medical use, having it had recommended by a colleague. However, the Sheffield retailers of the CPC464, disc drives and printers have no further details, including software availability.

1) What capacity is the 3" disc drive in formatted and unformatted form, and is this single or double sided?
2) What is resolution of both monochrome and colour monitors?
3) I understand a CP/M disc based word processing package is available. Is this also available as ROM? Could you please supply details of this 'Microscript.'
4) Is a double disc drive available for the CPC464, and does the DOS provide a total disc to disc copy facility to enable the creation of back up discs?
5) Do you envisage the 64K RAM being expansible at some time in the future?
6) In relation to question 5, although it is CP/M compatible, how many of the programs are available for use with the 42K user-available RAM?
7) Are the 3" discs readily available both as blanks and with software as the industry standards seem to be moving towards 5 1/4" and 3 1/2" standard both British and Japanese.

Dr.S.P.G.,
Sheffield.

ACU: Amsoft software is only available on cassette and disc, they will not be producing any ROM based software.

Amstrad have no plans to extend the 64K RAM in the near furture.

The following company are able to offer the service of producing any compatible CP/M software to the CPC464 format.

Timatic Systems Ltd.
Newgate Lane
Fareham
Hants
PO14 1AN
Tel: (0329) 239953

Appendixitis

Q: I have recently purchased an Amstrad CPC464 computer. On reading the manual I came across numerous references to control characters and additional commands given in Appendix VI, all I found was the graphics and Text Planners.

I would be grateful therefore if you could send me the part of the manual which is missing.

S.T.,
Oxon.

ACU: The reference to Appendix VI giving information on control characters is an error in the first edition of the manual. The information is contained in Chapter 9 Page 2.

What's in a (file)name?

Q: I have problem saving files on my disc system. The names seem to get scrambled....

Entered File Names = MICHELLE. TERRY. MARGARET. STEWART.

Saved wrongly as follows:

```
CAT
Drive A: user 0
MIMICHEL.BIN 17K TTERR. BIN 17K
MAMARGAR. BIN 17K STSTEWA. BIN 17K
101K free
```

It seems to go wrong with BIN files.

T.T.W.,
Bury St. Edmunds.

ACU: The problem described in your letter occurs when you use string variables as file names:

```
INPUT NAMES$
SAVE NAMES$,b,etc
```

The solution is far quicker than the explanation of the mechanism that causes this, and in order to avoid this problem you should add:

```
1 OPENOUT "dummy"
2 MEMORY HIMEM-1
3 CLOSEOUT
```

8th bit's bite

Q: One of the uses we intend to put our proposed system to is the preparation, via a word processor, of broadsheets, articles and papers in addition of course to membership lists and mailing lists etc. With such applications in mind the normally cosmetic requirements of subscripts, superscripts, and true descenders become quite important, and we are considering the SHINWA OR MANNESMANN MT80 as likely machines.

Our confusion arises from the fact that these printers require 8 bit ASCII codes and whether or not your computer would support such machines without losing any of their facilities, or would it be necessary for us to purchase something like the Parallel Interface offered by K.D.S. Electronics.

F.D.,
W.Yorkshire.

ACU: Regular readers please excuse us: this question is probably the most frequently asked of all, but new owners are entitled to be let in on the secret of the 8th bit...

The difference with the 7-bit interface will only have an effect if you wish to use your printer for graphics using ASCII codes over 126 - which isn't really ASCII anyway.

Word imperfect

Q: I have just bought an AMSTRAD CPC464 computer with DMP1 printer and the EASI-AMSWORD word-processor.

Whilst I appreciate that this program is an elementary one I do feel that the instructions are very poor indeed. For example it was only after a considerable waste of time and paper that I discovered how to paragraph text. A simple statement in the instructions - 'start new paragraph by pressing the cursor down key' would have saved all this trouble.

I should be grateful if you could help me with the following queries.

1. How do you paragraph when editing not creating?
2. How do you enter new text before the beginning of existing text?
3. Is there any way of incorporating text (such as an address) from a tape?
4. Is there any way of transposing blocks of text?

P.B.A.,
Shropshire.

ACU: As with all word processing programs however elementary, the [ENTER] key plays an important role. If you press [ENTER] at the end of each paragraph you will find that the cursor will be automatically placed at the beginning of the next line. Consequently, if you require a blank line between each paragraph, press the [ENTER] key twice. This principle is more satisfactory and quicker than using the cursor keys.

The cursor keys should be used for the purpose of moving the cursor around the text when editing.

It is possible to form a paragraph when editing text. Try placing the cursor at the beginning of the sentence you wish to start the new paragraph with, then press [ENTER]. The text to the right of the cursor will be moved onto the line below. This procedure should be carried out when the program is set to 'overtype' and not 'insert'.

To enter text at the beginning of existing text, place the cursor on the first character on the left-hand side of the screen and press [ENTER] once. A new line will be inserted.

For the purpose of saving your address on tape so that it can be recalled for use at any time, use the 'save' and 'retrieve' options from the main menu. Having retrieved the file from tape, choose the 'edit' option to proceed with your letter.

It is not possible to move blocks of text with this program. You need AMSWORD for advanced facilities.

Duplicity made easy

Q: As I wish to make backup copies of my system discs using CP/M commands (for my private use only), will I need to buy 2 disc drives?

P.C. French.
Kent.

ACU: You do not need two disc drives in order to make a back up copy of the CP/M disc. Amstrad have written some neat file and disccopy utilities that operate on a single disc drive.

Multi lingual

Q: I would like to buy a personal computer which I can use for business and engineering problems. Therefore I'm collecting knowledge about computers like Amstrad, Commodore, BBC Model B etc. After I researched, I learned that the Amstrad was better than most of the others. But I would like to know if the Amstrad is available to program with other programming languages than BASIC, especially Fortran, Assembler, Cobol, Forth, Pascal.

A.C.B.,
Turkey.

ACU: CP/M is well endowed with many programming langauges. All the ones you mention plus lots more. Cobol is an unlikely choice since it is so longwinded and of precious little use on a machine with a 38K TPA.

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***CHESTER** Computer Link, 21 St Werburgh St. Tel: (0244) 316516.
***CREWE** Microman Unit 2, 128 Nantwich Rd. Tel: (0270) 216014.
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***NOTTINGHAM** Jacobs Cptrs. 13 Middlegate Newark. Tel: (0636) 72594.
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WRITING ADVENTURES

PART III

In the first two parts of this series on writing your own adventure programs, you have learnt how to create your own 'scenary' and how to scatter various objects around for the adventurer to find. You may move around in this new 'world' of your own creation but although you may be able to see some interesting things, you cannot as yet interact with them!

The program lines given with each part fall into two groups. The first and most important are those that will build up into an operating system that you can use as a basis for adventures of your own. The second variety are those that represent examples of location and object data that I hope will explain what is going on...

The line numbers given should be used as shown in the article. In that way you can add to the program in your Amstrad and finally have a working adventure of your own. There will be some lines that will have sections added to them as we introduce new routines. These lines will be shown in full and will supersede previous lines of the same number.

Quo Vadis...

The first routine this month is one that is optional! Shown in listing 14, it is to display the exits that are 'visible' from the player's present location. Not everyone will wish to use this, as it is often felt that players should either find out for themselves or should have a good enough memory not to need this aid. Me...I like to be told!

```
100 REM ** LIST 14
1399 REM ** Display Visible Exits
1400 LOCATE #1,1,9:ERASE E$
1405 IF N(L%)<>0 THEN E$(1)=E$(1)+"N, "
1410 IF E(L%)<>0 THEN E$(1)=E$(1)+"E, "
1415 IF S(L%)<>0 THEN E$(1)=E$(1)+"S, "
1420 IF W(L%)<>0 THEN E$(1)=E$(1)+"W, "
1425 IF U(L%)<>0 THEN E$(1)=E$(1)+"U, "
1430 IF D(L%)<>0 THEN E$(1)=E$(1)+"D, "
1435 IF LEN(E$(1))>3 THEN E$(1)="s: "+E$
     (1) ELSE E$(1)=": "+E$(1)
1440 PRINT #1,"Visible exit";E$(1)+CHR$(
     8)+CHR$(8)+CHR$(16)
```



Line 1400 determines where our message will appear, in this case on the bottom line of the location description window. it also erases the one element array E$(), that will hold this message. An array is used for similar reasons to that that were given for the input command - so that a string of different messages will not be stored as the same variable (all but one being redundant) and sooner or later forcing the computer to perform a 'garbage disposal'. On the Amstrad, erasing an array is simple, quick and effective.

Lines 1405 to 1430 simply check the direction arrays to find which is valid. If valid, the appropriate letter, a comma and a space, is added to the information in array E$(). Line 1435 checks to see if more than one direction is being indicated (each direction adds three characters to the array). If more than one then "S:" is added before the directions. In line 1440 this whole package is then printed following the text "Visible exit". Note that hidden exits, stairs etc. are not necessarily displayed.

Parse it again Sam...

We now come to the most important part of any interactive computer game - The Command Recognition Routines. In an adventure game you would expect to enter words and phrases; somehow the program has got to sort these out into a recognizable form...and take the appropriate action.

The original adventure games (and still a fair percentage today), will only accept two word inputs in the form of verb/noun - "TAKE WAND", "EXAMINE TABLE" etc. More modern offerings go the whole hog and accept (and understand) such as "TAKE THE BIG BLUE BOOK, DROP THE RED BOOK AND TELL THE ELEVEN KING TO RUN EAST QUICKLY WITH THE JEWELS"!

The former system is very simple but also frustrating, because although hardened adventure players often use shortened words - "EXAM TABL", it is all to easy to type in "GET THE ROSE" and force a response requesting only two word inputs.

The latter system requires a very good understanding of the English language and its grammatical construction. Not to mention complex programming, together with ample memory and probably written in machine code to give an acceptable response time!

The routines suggested here, are very much a compromise but do allow a more flexible input command. The parser (to parse is to separate a sentence into its parts) starting at line 1600, will accept a three word input command. With the first word a verb, the second a modifier (adjective or adverb) and the third a noun.

The routine will ignore certain words such as "THE", "A" or "TO". Some single word commands are recognized; two word commands (not counting 'the', 'a' or 'to') are assumed to be in the form verb/noun.

This means that quite a range of commands are capable of being actioned, with the important addition of a reasonable degree of user friendliness. Examples of some of these inputs are: "INVENTORY", "GET THE RED ROSE", and "RUN TO THE SOUTH QUICKLY".

Take care...

In this section more than any other, you MUST think carefully about which words in the three sections: Verbs, Modifiers and Objects; you want 'your' program to recognize. Look long and well at the examples given before you commit yourself to typing in any of the data lines.

```
100 REM ** LIST - 15
1599 REM ** Parser
1600 ERASE W$:Q$(1)=Q$(1)+" ":Y%=1:WC%=0
1605 FOR W%=1 TO 3
1610 FOR I%=Y% TO LEN(Q$(1))
1615 IF MID$(Q$(1),I%,1)=" " THEN W$(W%)
     =MID$(Q$(1),Y%,I%-Y%):Y%=I%+1:I%=LE
     N(Q$(1))
1620 NEXT I%
1625 IF W$(W%)="THE" OR W$(W%)="A" OR W$
     (W%)="TO" OR W$(W%)="" THEN W$(W%)=
     " ":GOTO 1610
1630 IF W$(W%)<>" " THEN WC%=WC%+1
1635 NEXT W%
1645 IF WC%=2 THEN W$(3)=W$(2):W$(2)=""
```

Listing 15 shows the actual parsing routine; lines 1600-1645. Line 1600 erases the three element array W$(),, that will eventually hold the three words that we have to action. It also adds a space to Q$(1) that holds the 'keyed-in command' from our Input Command at line 1530. Finally it sets the character being analysed (Y%) to one and resets the word-count variable, WC% to zero.

Lines 1605-1635 scan through the characters in the command looking for spaces. If a space is found, then a word is assumed and words are assigned to the word array (W$()) in the order in which they are found. Before a word is assigned in this manner it is checked by line 1625 to see if it is to be ignored. Spaces are also checked for in this line, as the player may have typed



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in an extra space or two by mistake and as we want to be user friendly we ignore extra spaces as well.

Line 1630 increments the accepted word count and line 1645 checks to see whether the command consists of two or three words. If only two words have been accepted then it is assumed that these are in the form verb/noun and that the word in W$(2) is the object. It is re-assigned to the third element, W$(3) and W$(2) is made a null string (nothing).

We now have an Input Command reduced to three words or less. What we must now do, is to check these words against a vocabulary for the game, to see if they make any sense.

Start the action...

Lines 1700-1715 in listing 16, check the first word against our vocabulary of verbs held in array VB$(), (lines 14000,14010) Using a FOR...NEXT loop we scan both elements using the INSTR command and end the scan if a match is found. Only the first four letters of a word are used so you must avoid the possibility of there being a clash of words required (or thought to be required!) by the player. For example do not have the situation where a player might feel he needed to LIST something as well as LISTEN to something!

```
100 REM ** LIST - 16
1699 REM ** Check for Verb
1700 FOR I%=0 TO 1
1705 V%=INSTR(VB$(I%),LEFT$(W$(1)+"**",4
     ))+I%*240:IF V%<>0 THEN I%=1
1710 NEXT I%:V%=V%+3
1715 IF V%/4=INT(V%/4) THEN V%=INT(V%/4)
      ELSE V%=0
1720 IF V%=0 THEN 600
1725 IF WC%>1 THEN 1800
1729 REM ** Single Word Entries
1730 IF V%>13 THEN LOCATE #2,2,7:PRINT #
     2,"   Single word commands accepted
      are:      NORTH EAST SOUTH WEST UP
      DOWN HELP      SCORE LOOK LOAD SAV
     E and INVENTORY":GOTO 1500
1735 IF V%<8 THEN Q$(1)=LEFT$(W$(1),1):G
     OTO 2000
1740 ON V%-7 GOTO 1745,3000,5000,15000,1
     5100,15200
1745 LOCATE #2,2,10:PRINT #2,"Your score
      is :";SCORE:GOTO 1500
```

You can have sixty words stored in one program line (14000) so the I%*240 in line 1705 lets us keep count of which word has been recognized out of a total verb list of 76. We are asking the INSTR command to look for four characters starting from the first character in the string, so to find which word was recognized we must add three to V% and divide by four.

Beware of having too many verbs (or objects), it may seem clever to have hundreds of words in the vocabulary...*but* you may then have to provide a separate routine for each! That could well take up more memory than you have spare.

A careful balance must be kept between location descriptions, object descriptions and words recognized. Better to start with a smaller workable program and expand it later...even if this does mean a lot of extra keying-in.

Note that after the 'single word entries', all verbs are entered in alphabetical order - this will help *you* find them more quickly in the future! All synomyms are grouped at the end of the list (also in alphabetical order). Note that the verb list must be in CAPS, because the input command was converted to upper case in line 1560!

By checking the number determined in line 1710 against the integer of V%/4 in line 1715 we can see if what was found was a real word and not the rear part of one and the beginning of the next! If no match is found, the V% is zero and one of four nonsense phrases (lines 600 - 625) is displayed for a short time by listing 17 in window three.

```
100 REM ** LIST - 17
599 REM ** Do not understand - Responses
600 CLS #3:LOCATE #3,2,2
605 I%=INT(RND(5)*5):ON I% GOTO 610,615,
    620,625
610 PRINT #3,"Well..er, I'm not quite su
    re...":GOTO 960
615 PRINT #3,"That is not my sort of lan
    guage!":GOTO 960
620 PRINT #3,"I don't quite understand..
    .":GOTO 960
625 PRINT #3,"That does not make sense t
    o me!":GOTO 960
```

GOTOs are used in both 1720, 610 and 960 as this is easier to deal with than returning the program to the game loop and the subsequent conditional GOTO 1500. Use of direct branches like this, is often frowned upon...but sometimes they make life much easier.

Providing a valid verb has been detected, line 1725 checks whether more than one word has been input and if so the program is directed to the object checking routine at line 1800. Line 1730 checks to see if a one word input is valid and if not displays an appropriate message in window two.

Acceptable single word inputs are the first 13 words in the verb list, you may of course modify this if your program needs it. Direction commands and INVENTORY; the first seven 'verbs;', are reduced to their first letter (line 1735) and are sent to the existing 'One Key' routine at line 2000.

Any other acceptable single word command is sent to the appropriate routine in line 1740. The simple SCORE; is dealt with in line 1745.

Object lesson...

Checking for valid objects is carried out in lines 1800-1815, If no valid object is found then off to a different set of nonsense phrases at 630 etc. If only two words were entered then the program skips the modifier check (line 1825).

```
100 REM ** LIST - 18
1799 REM ** Check for Object
1800 FOR I%=0 TO 1
1805 N%=INSTR(NN$(I%),LEFT$(W$(3)+"**",4
     ))+I%*240:IF N%<>0 THEN I%=1
1810 NEXT I%:N%=N%+3
1815 IF N%/4=INT(N%/4) THEN N%=INT(N%/4)
      ELSE N%=0
1820 IF N%=0 THEN 630
1825 IF WC%=2 THEN 2100
```

Listing 18 checks for the objects. The order in which the objects are listed in lines 14050, 14060 is *very* important. They are divided into several groups (all in alphabetical order!). The first group, up to number 31 may all be TAKEn and relate directly to the object data in lines 12010 onwards (described last month). The class of object in line 12215 (-1) signifies that the object has yet to be 'created'.

```
100 REM ** LIST - 19
12009 REM ** Object data
12010 DATA "A short handled throwing axe
      "
12015 DATA 0,1,"An Axe"
12020 DATA "A closely woven wicker baske
      t"
12025 DATA 9,1,"A Basket"
12030 REM ** More data
12210 DATA "A long straight arrow!"
12215 DATA -1,5,"An Arrow"
12220 DATA "A small pile of ash"
12225 DATA -1,5,"Some Ash"
12230 REM ** More data
12290 DATA "A piece of parchment"
12295 DATA 12,5,"Parchment"
12300 DATA "A very dirty, two handed swo
      rd"
12305 DATA 4,5,"A Sword"
12310 DATA "A small curious key!"
12315 DATA 6,5,"A Small Key"
```

This group is divided into two, where the first set (up to number 20) will NOT have a special message if they are EXAMINEd.

Note also that numbers 10 and 31 are indicated by ++++ this is because they are both KEYs - one is small and the other large. KEY is detected by number 33 and having been detected will use a routine to check which key is which!

1	AXE*	2	BASK	3	BOW*	4	CAND	5	COIN
6	CORK	7	FEAT	8	GLOV	9	HELM	10	++++
11	LEAF	12	MIRR	13	RAG*	14	RING	15	ROPE
16	ROSE	17	RUBY	18	STEE	19	STIC	20	WOOD
21	ARRO	22	ASH*	23	SHAV	24	BOTT	25	BOX*
26	CHAR	27	FLAS	28	LAMP	29	SCRO	30	SWOR
31	++++	32	----	33	KEY*	34	----	35	----
36	BOAT	37	BRAN	38	CARV	39	CAVE	40	COUN
41	DOOR	42	DRAG	43	EAGL	44	FERR	45	FIRE
46	NYMP	47	OAR*	48	POOL	49	RUNE	50	STAT
51	STEP	52	STUD	53	TOWE	54	TREE	55	TROL

56	WALL	57	----	58	----	59	----	60	----
61	CLOI	62	COUR	63	HAND	64	ELM*	65	HORS
66	KNIG	67	MAN*	68	OAK*	69	RIVE	70	SHOP
71	SHRU	72	SIGN	73	STRE	74	----	75	----
76	OIL*	77	WATE	78	----	79	----	80	----
81	----	82	----	83	----	84	----	85	----
86	ASHE	87	BLOO	88	FLOW	89	GLAS	90	KEYS
91	KNOB	92	LANT	93	LEAV	94	PARC	95	RAGS
96	TALI	97	TIN*	98	TIND	99	----	100	----
101	----	102	----	103	----	104	----	105	----
106	----	107	ALL*	108	EVER	109	N***	110	E***
111	S***	112	W***	113	U***	114	D***	115	NORT
116	EAST	117	SOUT	118	WEST	119	UP**	120	DOWN

The next group (35-56) may all be EXAMINEd and may well have some significance but may not be TAKEn. The third group (61-73) will all appear in location descriptions and will NOT have a special message if they are EXAMINEd.

OIL and WATER (76, 77) may be taken...if you have something to carry them in, but will yield nothing special if EXAMINEd.

Those from 86 to 98 are all synonyms that may be used for some of the above. 107 onwards are all special cases which will be dealt with but not as normal objects.

Although this system is somewhat complicated and definitely needs some thought in preparation, it uses up to 1500 less bytes of memory than methods using series of arrays...just have patience (you cannot write an adventure without that anyway.) and think logically! The memory saved is worth it.

Lines 30000 - 30140 could help here, they enable you to print out to the screen: a formatted list of your objects. First RUN the program - ESCAPE and type in GOTO 30000. Press the space bar to stop. This is shown in listing 20, and, whilst not necessary for the running of the program it is very useful for writing and debugging.

```
100 REM ** LIST - 20
29999 REM ** Check object vocabulary
30000 MODE 2:INK 1,20:INK 0,0:PRINT "  O
      BJECTS"
30010 A$="  ":B$="     "
30020 FOR J=0 TO 1
30030 FOR K=0 TO 55 STEP 5:IF K<9 AND J=
      0 THEN PRINT " ";
30040 FOR I=0 TO 4:PRINT K+I+1+J*60;A$;M
      ID$(NN$(J),(K+I)*4+1,4);B$;
30050 REM  ** FOR I=0 TO 4:PRINT #8,K+I+
      1+J*60;A$;MID$(AD$,(K+I)*4+1,4);B$
      ;
30060 IF (K+I+1+J*60)>7 THEN A$="  ":B$=
      "    "
30070 IF (K+I+1+J*60)>98 THEN A$=" ":B$=
      "    "
30090 NEXT I
30100 PRINT " "
30110 NEXT K
30120 NEXT J
30130 Z$=INKEY$:IF Z$<>" " THEN 30130
30140 STOP
```

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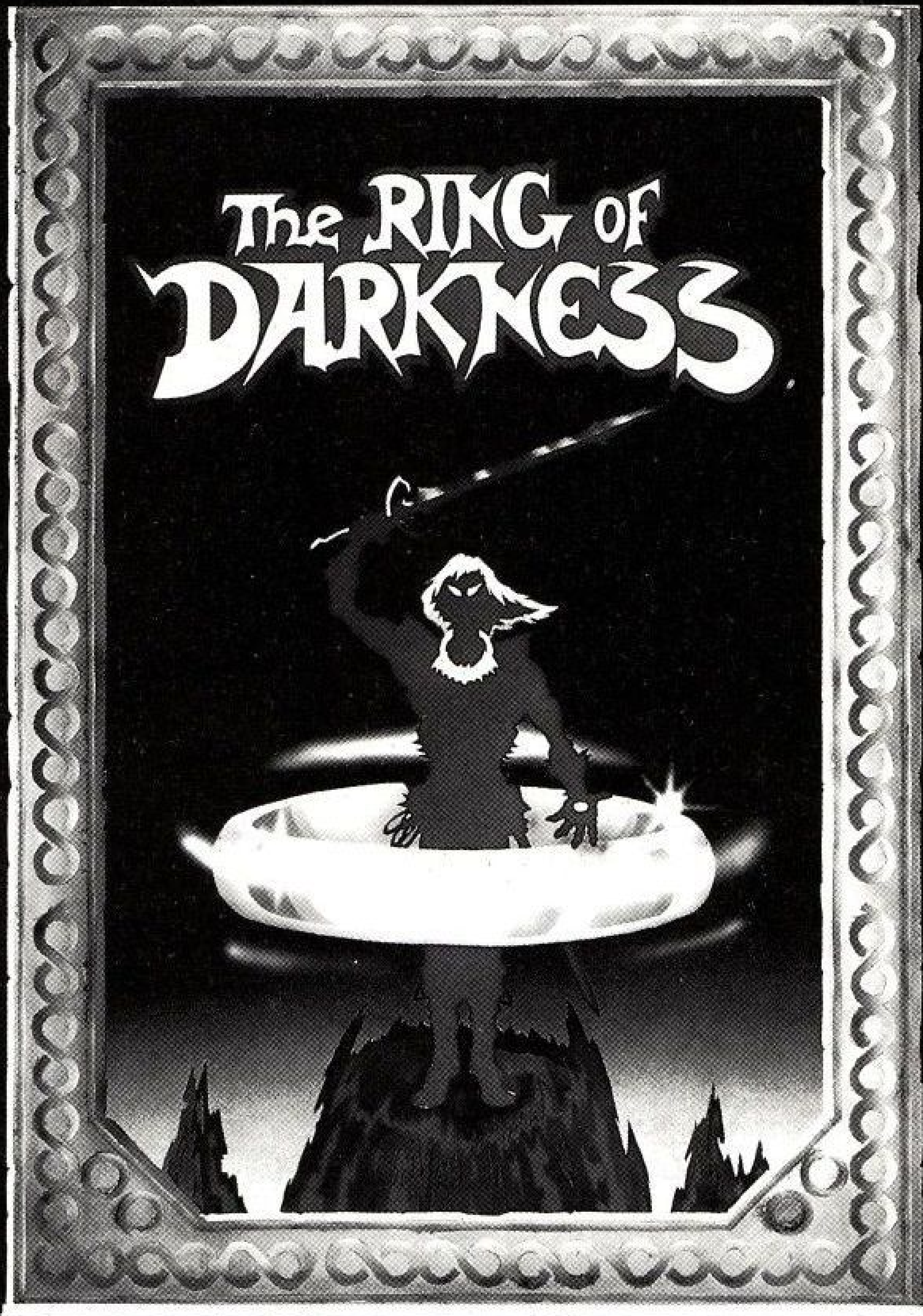
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Lines 1900-1905 check for acceptable modifiers (listing 21) using a cut down version of the routines for verbs and objects. Although you may only require the program to recognize three or four modifiers for significant parts of the adventure, include several that occur in the location descriptions. Little extra memory is used, as you need not check further on these 'dummies'. Line 1910 throws out any odd ones the player may think of.

```
100 REM ** LIST - 21
1899 REM ** Check for Modifiers
1900 A%=INSTR(AD$,LEFT$(W$(2)+"**",4)):A
     %=A%+3
1905 IF A%/4=INT(A%/4) THEN A%=INT(A%/4)
      ELSE A%=0
1910 IF A%=0 THEN CLS #3:LOCATE #3,2,2:P
     RINT #3, W$(2);"...is not a word I
     need!":GOTO 960
1915 GOTO 2100
```

Finally alter lines 150 - 160 to include the new variables met with this month and add line 170 that directs the program to read the vocabulary lines from line 14000 (listing 22).

```
100 REM ** LIST - 22
150 DIM Q$(1),L$(50),E$(1),OB$(31),OS$(3
    1),W$(3),VB$(1),NN$(1)
155 DIM N(50),E(50),S(50),W(50),U(50),D(
    50),OC%(31),OP%(31),SV%(16),SN%(13)
160 SCORE=0:L%=1:LC%=0:I%=0:X%=0:I=0:DL=
    0:Y%=0:WC%=0:W%=0:V%=0:N%=0:A%=0:S%=
    0
170 GOSUB 14000
13999 REM ** Verbs
14000 VB$(0)="NORTEASTSOUTWESTUP**DOWNIN
      VESCORLOOKHELPQUITLOADSAVE--------
      ATTABENDBURNBUY*CLEACLIMCLOSCROSCU
      T*DIG*DRINDROPEAT*EXAMFILLGATHGET*
      GIVEGO**JUMPLIGHMAKEMOVEOIL*OPENPI
      CKPOURPRESPULLREADRUB*RUN*SAY*SELL
      SHUTSMELSTEASWIMTHROTURNUNLOUSE*WA
      VEWEAR----"
14010 VB$(1)="CHOPENTEHIT*KILLLEAPOFFEPU
      SHPUT*SEARSNIFSTABSTRITAKETALKTWIS
      WALK---------------------"
14049 REM ** Nouns
14050 NN$(0)="AXE*BASKBOW*CANDCOINCORKFE
      ATGLOVHELM++++LEAFMIRRRAG*RINGROPE
      ROSERUBYSTEESTICWOODARROASH*SHAVBO
      TTBOX*CHARFLASLAMPSCROSWOR++++----
      KEY*--------BOATBRANCARVCAVECOUNDO
      ORDRAGEAGLFERRFIRENYMPOAR*POOLRUNE
      STATSTEPSTUDTOWETREETROLWALL------
      ----------"
14060 NN$(1)="CLOICOURHANDELM*HORSKNIGMA
      N*OAK*RIVESHOPSHRUSIGNSTRE--------
      OIL*WATE--------------------------
      ------ASHEBLOOFLOWGLASKEYSKNOBLANT
      LEAVPARCRAGSTALITIN*TIND----------
      ----------------------ALL*EVERN***
      E***S***W***U***D***NORTEASTSOUTWE
      STUP**DOWN"
14099 REM ** Adjectives
14100 AD$="ANCIBENTBLACBLUEBRASBRONCLEAC
      OPPCROOCURIDIRTELVEEMBRGOLDHANGIRO
      NLARGLEATLOVEOAKEOLD*QUIEQUIKRED*S
      ILVSMALSOFTSTRAWHITWOOD"
14200 RETURN
```

Next month we will look at what the program will do now that we can finally talk to it...and it can talk back!



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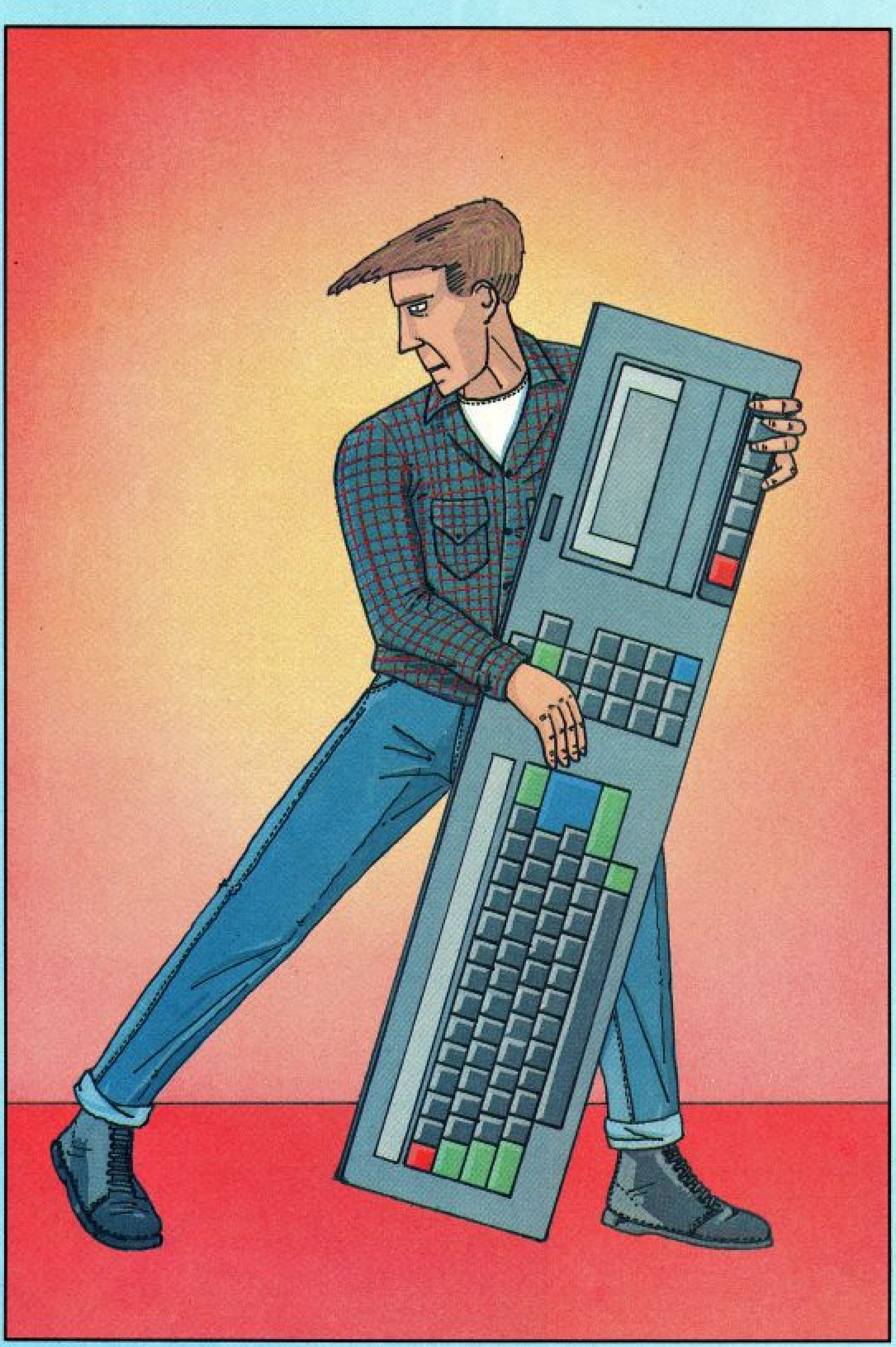
THE MUSICAL AMSTRAD

Part 4

JEREMY VINE

This month I'm going to look at using the Amstrad machine for sound effects - noises which can be used for their own sake, in games or as an accompaniment to music. Percussion is an important feature within music and the principles learnt in producing these sounds can be equally applied to writing sound effects for games. To do this you'll need to understand how the envelope statements work. This feature of the BASIC sound commands often confuses people but it's really quite simple and is more than just an enhancement to sound production.

The sound generation chip (AY-3-8912) is capable of producing a wide range of sounds and effects by controlling the shape of the sound wave. These are often not easily accessible on other micros, but Amstrad have allowed this control from the envelope commands. Two main commands exist. ENV, which controls the volume envelope and ENT, the tone envelope. The problem that many people find when they first look at these commands is the bewildering number of possible parameters -sixteen in all! Enough to make the most hardened enthusiast take fright!



At this stage you are left with two choices. Either take a chance and randomly enter varying digits or learn how these parameters effect the sound chip. The former can offer some very unexpected sounds but it is unlikely you will quickly find the sound you're looking for - if ever! The latter course may sound more painful but really you need only learn three parameters. To see what I mean let's try defining a percussive instrument.

From Engines to Snare Drums

Type in the following short example and run.

```
10 ENV 1
20 FOR length = 1 TO 30
30 SOUND 7,748,length,15,1,0,1
40 NEXT length
```

First thing you'll notice is the length of the ENV command line. Only one parameter has been entered, the number of the envelope being used, in this case number 1. Line 30 shows that Volume Envelope number 1 is being used (the 5th parameter). The sound generated isn't that exciting and sounds like a model aircraft engine.



But this sound can be modified by the addition of the volume envelope. Change line 10 to read as follows:

```
10 ENV 1,23,-68,3
```

You should now hear the sound of a snare drum being played. This subtle change is due to the addition of the ENV statement. "But wasn't the ENV statement already there?", I hear you cry. Well yes and no! I was indeed using the ENV statement in the original example but it need not have been used. Confused? Well, you should be! However all is not lost. Remove line 10 and run the program.

What do you hear? You should still hear the sound of the snare drum.

Now type in:

```
ENV 1
```

and run the program again. You should now hear the original sound of the engine noise. The above, somewhat deliberate, confusing examples demonstrate some important lessons. Firstly, that using ENV followed by the envelope number (in the above example, 1), makes the envelope being used inactive. In other words, the instructions to the sound chip to create a certain shape is forgotten.

This is very important to remember. Once an envelope is defined it remains active until the system is reset or another envelope of the same number is written. If you have used your machine from cold (ie switch-on) then there was no need to use ENV 1 as there was no previous command in memory. But it's useful to remember that when you remove an envelope statement you MUST clear that sound effect out of the system.

Secondly, I only used three additional parameters in the ENV statement. The first I have already explained but the next three parameters are the core of the command. Understand these values and the rest should be plain sailing.

ENV - The Volume Envelope

Let's take another example. Change line 10 to read:

```
10 ENV 1,5,2,1,3,-5,2
```

and add lines 15 and 50 as follows:

```
15 FOR repeat = 1 TO 8
50 NEXT repeat
```

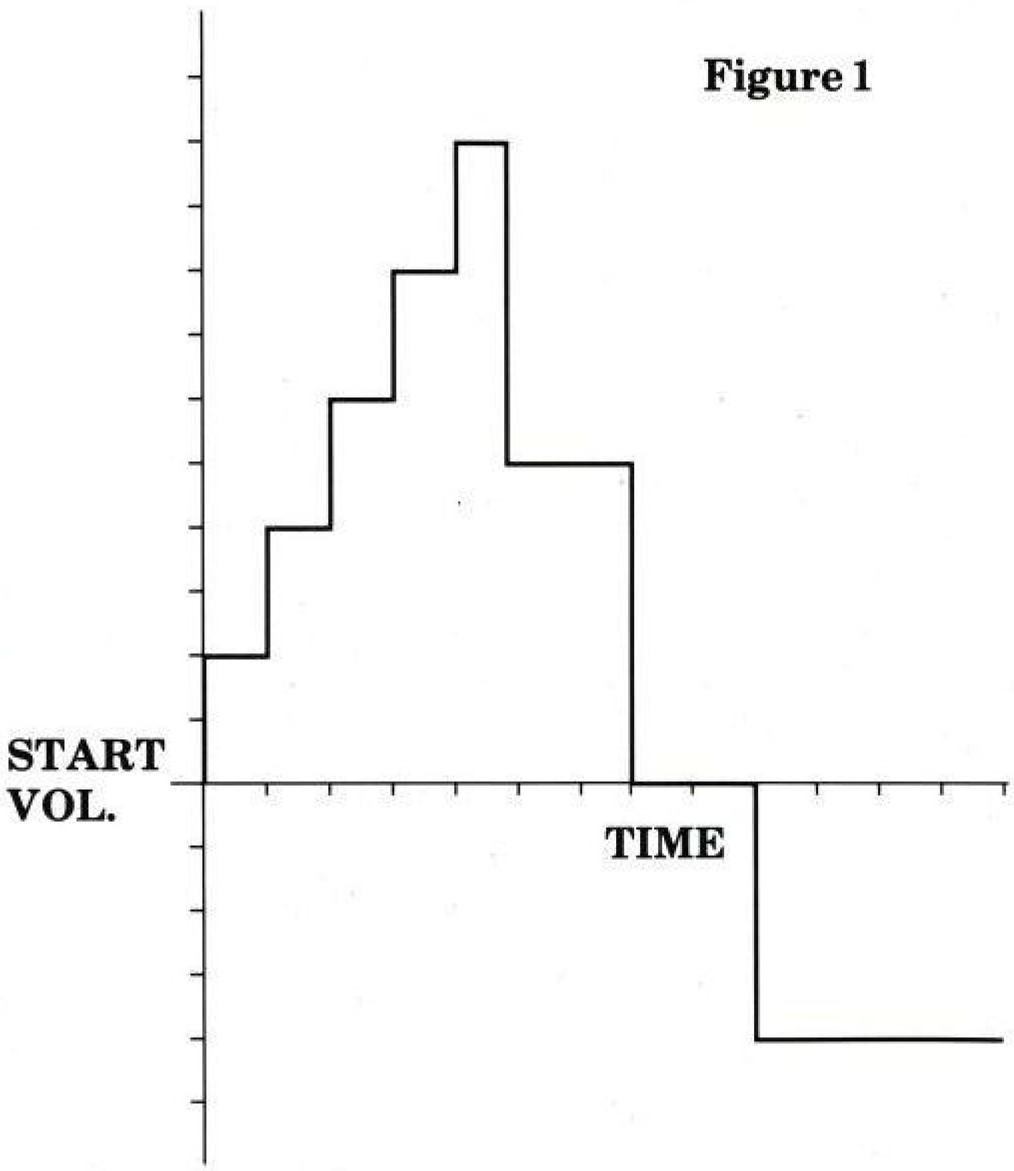
We can now pull apart this rattling sound to discover what is happening. Refer to figure 1 which shows the shape of the envelope in line 10.

The shape of any single note can be divided into five sections, though you can choose how many sections you need, up to a maximum of five. Each of these sections has three parameters (the values shown in the first example), these being the Step Count, Step Size and Pause Time.

A section must be complete (ie all three parameters) otherwise a 'syntax error' message will be generated. The minimum and maximum values for each of these parameters can be found in the user guide.

The Step Count is the first of the three parameters and refers to the number of steps in each section. In our last

Figure 1





example the step count in section 1 is therefore five and in section 2, three.

Each of these steps has a fixed duration (length of time) and this is the third parameter, the Pause Time. It's measured in hundredths of a second and this duration is constant for all the steps within a section. In line 10 the pause time in section 1 is one and in section 2, two.

Lying between these two parameters is the Step Size and this indicates how large or small a single step is. In effect it determines the amount by which the amplitude increases or decreases at each step, a negative number indicating a decrease. Section 1 shows an increase in step size of two and section 2 a decrease of five.

I haven't defined three further sections but you should be able to see by now how you need only understand the three parameters, Step Count, Step Size and Pause Time to see how they are repeated throughout the statement to give a possible sixteen parameters including the envelope number.

To really get the best from the sound chip you should have an idea of the shape of the sound wave you intend to devise. You can check whether your graph is correct by checking the total duration. This can be easily done by multiplying the pause time figure by the step count figure in each section and adding these totals together. Try working out how long the following envelope should sound for:

```
ENV 1,10,4,3,5,-3,20,1,0
,20,5,3,10,10,-3,30
```

Remember that there are five sections and that we are measuring in hundreths of a second.

The answer is five seconds because:

```
(3*10) + (20*5) + (20*1) +
(10*5) + (30*10) = 500
```

As we are counting in hundredths of a second, 500 equals five seconds.

Drawing graphs in advance is one way of creating a sound but chances are you'll have no idea what the shape of the sound looks like. The best way to learn is to play around. But now at least you are armed with a knowledge of how changing a value may alter the shape of the sound wave. Gradually you will come to understand the relationship between the envelope parameters and the sounds they generate. To help you I include a short program to generate different volume envelopes using only section 1. You may like to build on it as it's only intended to show you how to help yourself. I have called this from a much longer program in my book which allows the user to generate envelopes using all five sections and definition of the SOUND statement.

```
10 REM Volume Envelope Generator
20 REM (1st Section Only)
30 :
40 PRINT"Enter step count ?"
50 INPUT stepcount
60 PRINT"Enter Step Size"
70 INPUT stepsize
80 PRINT"Enter Pause Time ?"
90 INPUT pausetime
100 ENV 2,stepcount,stepsize,pausetime
110 SOUND 1,478,15,2,0,0
120 ENV 2
130 PRINT"Press a key for another sound"
140 x$=INKEY$: IF x$ = "" THEN 140
150 GOTO 40
```

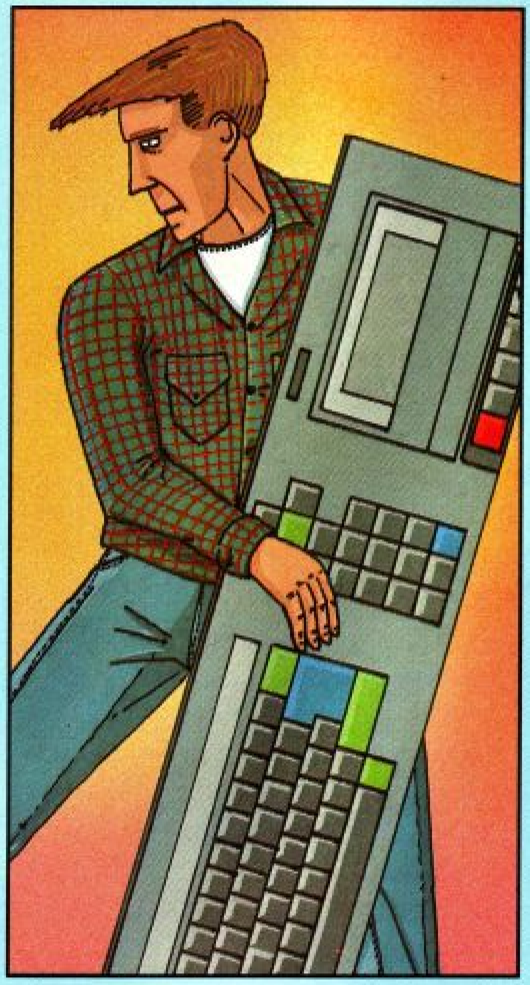
The program is extremely simple but it's best to start at this level and gradually increase the level of complexity. Don't forget the SOUND statement though. It still has an important function and this can be seen in previous examples where I have used SOUND 7. Try using single channels to see how the snare drum effect is changed.

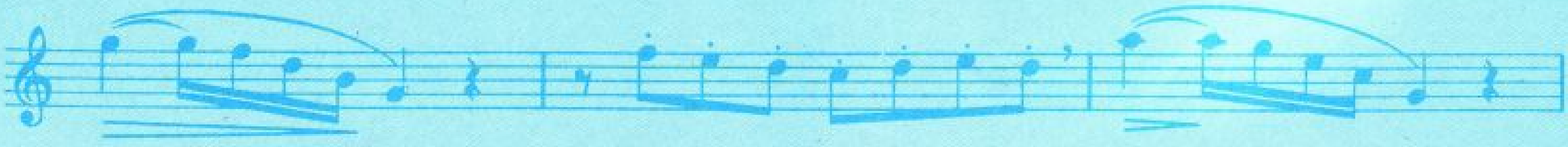
Building your own sound is fun and in itself is worth the time and effort. But as a games writer or musician, sound effects add an extra dimension to your work. Once the complexities (are they really that bad?) of the sound chip become clearer you should start to build your own library of sounds. Perhaps even build up a library of musical instruments.

This takes us back to an earlier comment. To get the most out of the chip you need to understand the shape of a sound. For example, think of the difference between the sound of an organ and a plucked string instrument. The latter has it's volume rising and falling very quickly. The organ on the other hand has a very sustained sound and it is this, amongst other features which distinguishes the sound of the two instruments to our ears.

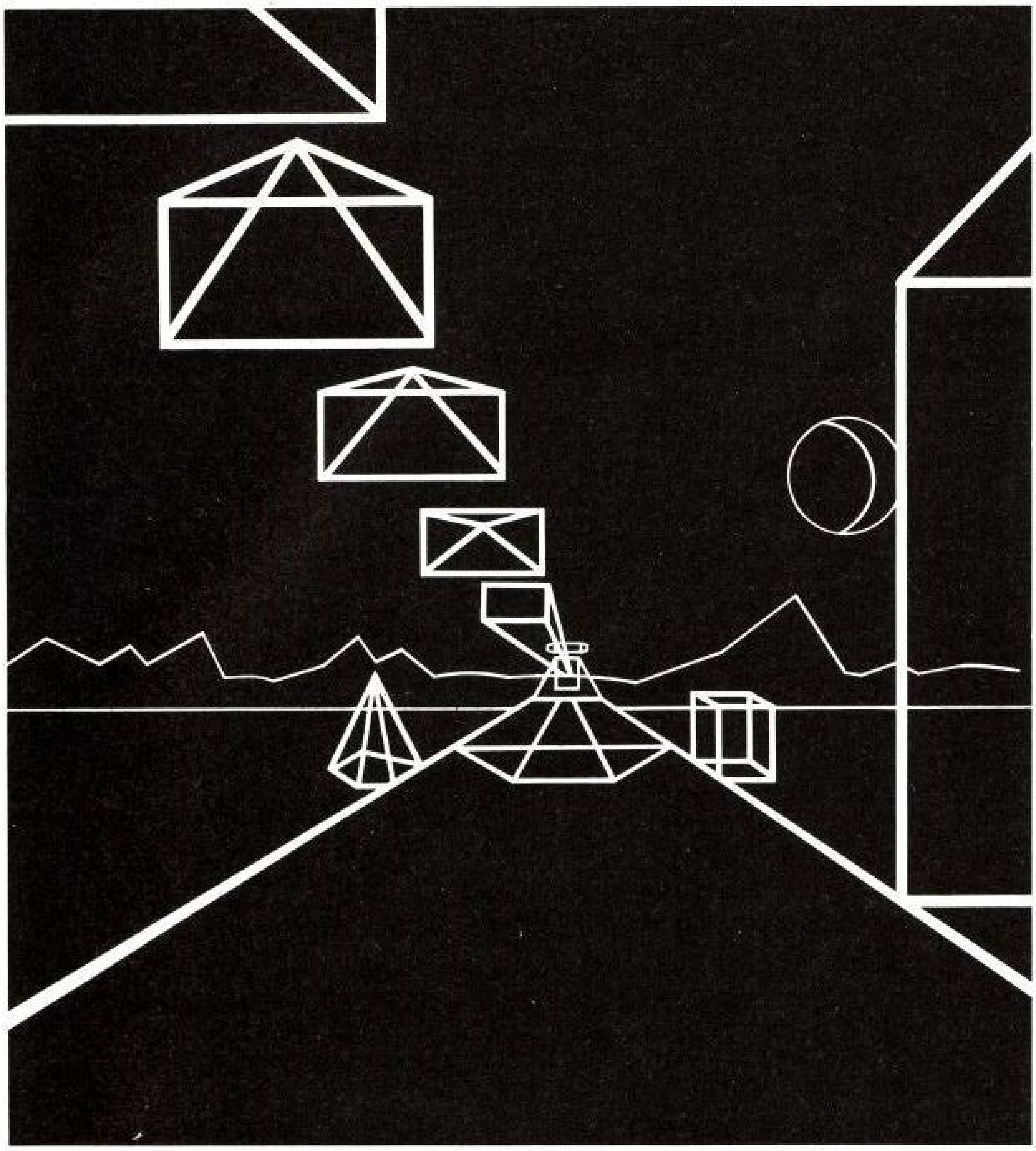
But remember, the sound chip does not produce a pure sine wave. This restriction will hinder you in seeking perfection, and therefore don't expect the sounds of an expensive synthesizer. However, despite that drawback, some approximations can be made.

And that wraps it up for this month. I've concentrated very much on the volume envelope statement and not so much on the music. But what has been discussed here is the basis of adding more variety into your music. Try adding different sounds to your own music or that already shown in previous months. Happy playing!





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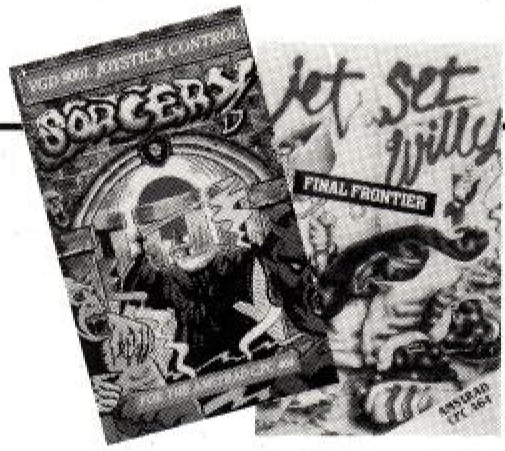
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'SUPERPOWER' ROM-BASED SOFTWARE

A complete range of Rom-based programs is under development, releases being planned at the rate of two per month, starting in June. Available from June 1st are the Mailing List/Club Membership program plus the Disk User's Utilities Rom.
Later releases will include Word Processor, Spreadsheet, Database and Graphics/Printer routines packages – with data interchange facilities – PLUS an Enhanced Basic/Toolkit program and a Machine-Code Monitor.



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'SUPERPOWER' MAILING LIST (AND CLUB MEMBERSHIP) PROGRAM (REF A102)

The program handles very large lists of names and addresses on a selective basis, acts as a simple Database, and is particularly suitable for Club Membership records. The main features are as follows:- Each Record can contain up to 19 fields, those to appear on labels being user-selected. Variable length fields are used to optimise memory and disk space.
In practice, approximately 2000 records containing name and address and two non-label fields can be held on one side of a disk. Multiple double-sided disks are catered for. Each record can have up to 20 classification indicators. When used as Membership List, 12 can be nominated for monthly subscription reminders.

A screen report gives breakdown by categories. Printing options include Label fields only, and Total Record including classifications. Label can be of two standard sizes or user-defined. Program works with any parallel printer. Alphabetical Order is dealt with on Entry. User choice of Keyword e.g. 'J' ohn or 'S' mith. The Name field can be searched for the first part or the whole of a keyword. The whole file can also be searched for any string. There is sophisticated line and character editing, including change of keyword. Function Keys can be defined to give single key entry of commonly used string e.g. 'Membership No.' In Entry mode an automatically incrementing number is available. Foreground and Background colours can be selected.



SUPERPOWER DISK USER'S UTILITIES ROM (Ref A103) £39.95.

'SUPERPOWER' DISK USER'S UTILITIES ROM (REF A103)

This program allows detailed inspection and modification of information held on disk. It is of particular use in the recovery of data from corrupted disks. Individual sectors can be read from and written to. All data can be output to the screen and/or printer. The program also contains a number of functions of use to the assembly language programmer.
Main Functions.
FILELOAD – loads first sector into buffer and remainder into memory for fast access later.
READ – reads a sector into the buffer and enters Edit Mode.

EDIT – displays the current buffer. Data displayed is Buffer Address, Hexadecimal representation of each byte and ASCII representation of each byte.
Depending on mode selected, display is of 12 or 24 lines of 8 or 16 bytes.
– modification of Hex numbers, changing the ASCII automatically and vice versa.
– comprehensive cursor controls for easy editing.
FIND – can search a sector or total file for an ASCII string.
WRITE – writes a sector previously read by READ or FILELOAD.

SUBSIDIARY FUNCTIONS –
CATALOGUE – similar to AMSDOS catalogue.
MODE – Select 40 col./12 line display or 80/12, 40/24 or 80/24.
INK – Select Background and Foreground Colours.
ROM CHECK – lists all sideways Roms, giving Position, Foreground or Background, Name, Version No. etc.
OTHER DISK COMMANDS – Access to other commands such as Format and Verify is provided directly from the Rom.
ASSEMBLY PROGRAMMER'S AIDS.
Disassembler. Relative Jump Calculator. Calculate the Sum and Difference of two hex numbers. Hex to Decimal Conversions – and vice versa. Intelligent Copy.

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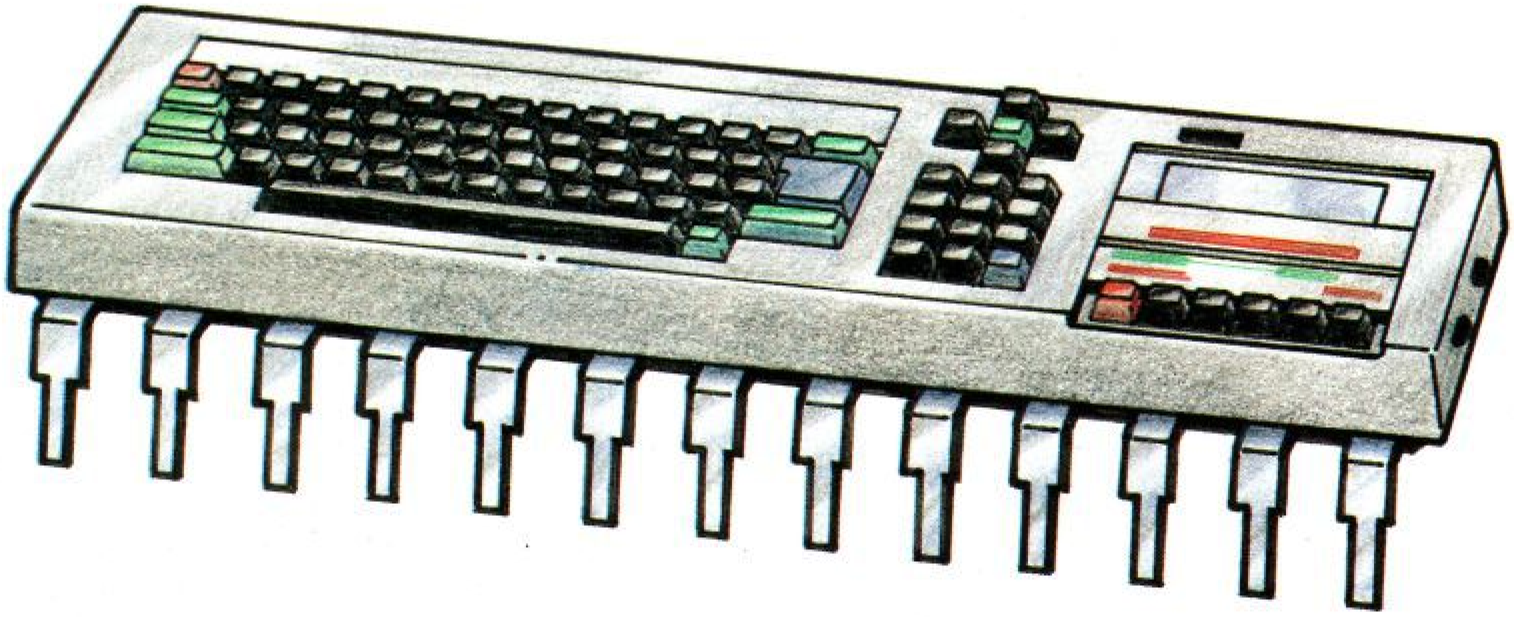
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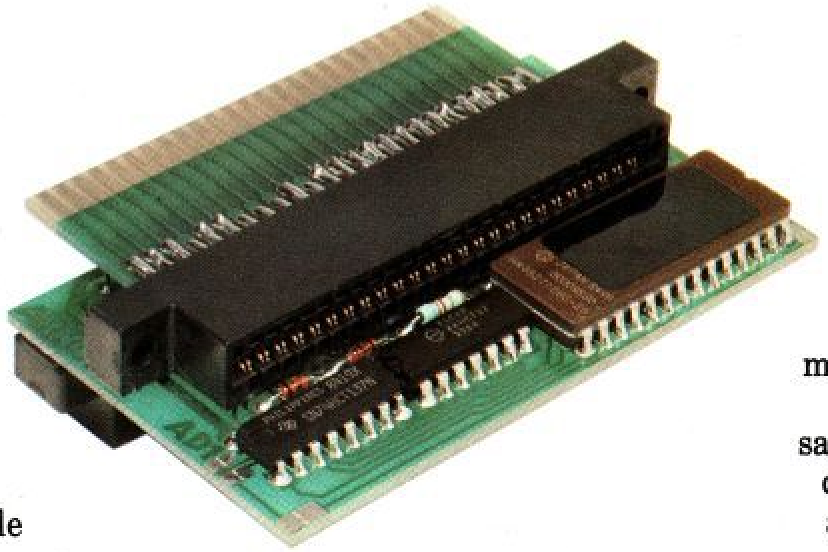
The long - awaited sideways ROM arrives

by VAX



At last! an add-on ROM for the CPC464! This innovative device has to be the most compact piece of kit yet produced for the AMSTRAD. Contained on the 83x50mm circuit board is a powerful Z80 assembler, a dissassembler, a monitor, relocator and a neat little text editor plus several handy utilities you can use from BASIC.

What's more it uses less than 1 K of your RAM. To good to be true ? Read on.



It does not come in any form of box, you get just the bare board. This saves reviewers the trouble of dismantling it and also cuts the cost. You also get a friendly, legible instruction manual with many examples and a list of op-codes though their example on patching the printer output routine assumes that the contents of a jumpblock are always the same. The point of jumpblocks is to hold any changing addresses so although this patch works on a CPC664 it is more by luck than judgement.

The device simply plugs in the back of your computer, you turn on and... instant assembler ! Those of you with disc drives and speech synthesisers need not worry because it has a through bus for you to plug into on the other side . There is another edge connector facing upwards which should be covered with insulating tape to prevent the ingress of dust,coffee and biros. This is for "future expansion".

Unfortunately it does not physically fit onto a CPC664 but Arnor will shortly be producing one that does.

There are disc and cassette versions of the package available but they do lack some of the commands that play with the ROMs.

It is not possible to back up the disc as Arnor have altered some checksums which will be difficult to change for even seasoned hackers.

When you turn on your machine you get an extra bit in your sign on message saying "MAXAM Assembler copyright 1985 Arnor Ltd." and everything else should behave exactly as before.

The review model came unstuck when I tried to enter CP/M, a fault soon traced to a loose cable on my disc drive . The interesting bit comes when you use the first of the extra external commands called HELP . Easy to remember that one.

The help command gives a list of the names and numbers of all the ROMs currently active on your system , usually : BASIC , MAXAM and maybe your disc ROM.

Typing I HELP,n , where n is the number of a ROM , displays all the availiable commands on that ROM so you can see what Arnor has to offer:

Commands Availiable on MAXAM ROM.

MAXAM	The main MAXAM menu.
ASSEMBLE	Assemble Z80 code from BASIC.
ASSEM	As above but suppressing messages.
CLEAR	Delete editor text.
CAT	As with normal BASIC.
FIND	Search for a string in REM statements.
MODE	Changes between modes 1 & 2.
SPEED	Set write speed (cassette).
HELP	See above.
HELP , n	See above.
MAXOFF	Disables MAXAM.
MSL	Use screen in low memory.
MSH	Use screen in high memory.
ROMOFF	Turns off selected ROMs.

Should any other ROM contain the words CLEAR, FIND or HELP , you can prefix these MAXAM commands with an 'M' to avoid confusion.

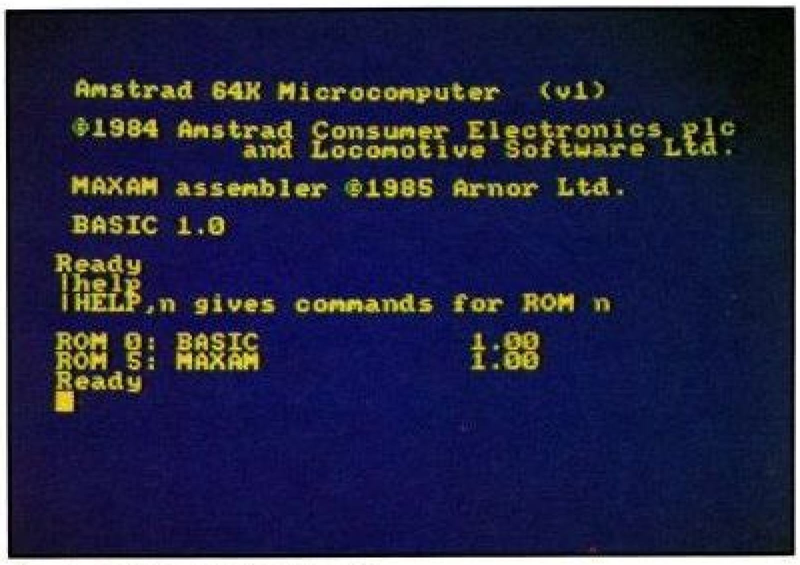
The main feature is of course the assembler. This uses the standard Z80 mnemonics beloved by programmers all over the world and are the same as used by Hi-Soft's Devpac and Kuma's ZEN. Typing '|MAXAM' puts you in a colourful menu page offering all the availiable commands for editing,listing,saving and printing:

MAXAM Commands:



The text , or source code , can be entered using the built in editor or as REM statements in a BASIC program (in-line assembly) . Oh yes, you can also edit and create BASIC programs using the editor as long as they are saved as ASCII files. It can even do the line numbering for you.

The assembler itself understands most of the common conventions used. For instance ; a label may or may not be followed by a colon and both DB or DEFB may be used to reserve bytes of memory. Labels and



A new sign-on message

symbols can be forcibly defined by preceding them with a full stop. This means you can have labels with names like LDIR which would normally be treated as a Z80 instruction by the assembler. The labels can also be of any length and all the characters are significant. You can also use underline characters in your labels.

The assembler prevents you from doing daft things such as assembleing code into the BASICs user defined graphics area or the ROMs workspace and in the case of a disc or cassette version, the assembler and editor itself. This can be dissabled by the use of a LIMIT command in the source code.

Code is assembled to directly above BASICs HIMEM unless you state otherwise. It is easy to pass variables containing the location of the code between BASIC and the assembler if you are using in-line code.

Source code prepared on a ZEN or Devpac assembler can be typed straight in with little or no conversion. ASCII files can be loaded directly into the editor and assembled immediately. It is even possible to assemble a file off disc or cassette without loading the source into memory.

The assembler allows things such as conditional assembly nested to a depth of ten levels , the option to include other files in the assembly and the production version will have an option to save assembled code as CP/M command files simply by giving them the extension .COM .

The monitor is a very useful debugging tool. You can TRACE through your machine code By quoting break points, time observing the contents of all the registers, the stack, the next instruction to be executed. It is possible to use lower memory to hold the screen whilst examining memory locations on the normal screen. This is occasionally useful for debugging graphics programs directly accessing the screen that would either corrupt or be corrupted by diagnostic messages, but more useful for editing sideways RAM, sometimes fitted for ROM development, that resides 'underneath' the normal screen.

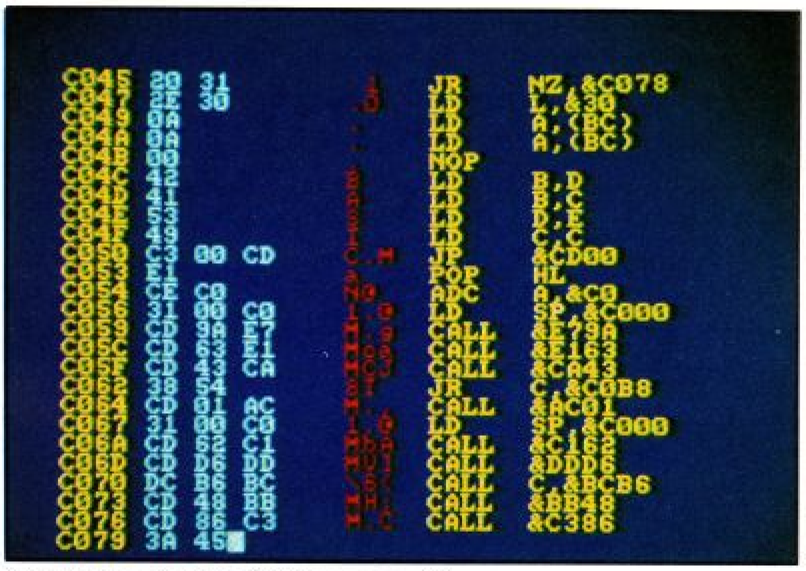
You can also use the monitor to follow through other

peoples programs and see what makes them tick, or to copy them, but you don't really do that do you?

For those who do, the disassembler is a boon. It dumps disassembled code to the screen or printer (sorry ! Not to the disc or editor) together with ASCII characters where applicable. You just follow the listing through using the monitor until you come across that elusive infinite life POKE. In mode 1 the columns are displayed in different colours, very pretty . Why can't other utility programs make such good use of colour in them?

It disassembles ROM as well as RAM so you can have a PEEK at the BASIC and disc ROMs but not the Arnor ROM. Those cunning Arnor people have put in a piece of code to stop you doing this ! Oh well , I will just have to use somebody else's disassembler ....

For those of you who prefer to handle the memory as lots of hex numbers or as ASCII text, the memory editor is the best I have seen. it allows you to scroll through memory , forwards and backwards , editing with the cursor in either hex or ASCII characters.



Technicoloured Disassembly

Another very useful feature is the FIND command which allows you to search memory for a given ASCII string or a sequence of hex bytes , possibly containing "wild cards" , up to a length of 20 characters or 8 bytes . That is computer jargon for a character or byte that matches all other characters or bytes. I use this to search for calls to the computers firmware.

Also availiable is a semi-intelligent relocator. This not only moves blocks of code around but also tries to get them to work once they are moved. Unfortunately , this relocates all double byte addresses in the range of those being relocated and it is possible that a "load register with x" command could have the value of x altered even if x is not an address. The manual suggests a workaround but if you have the source code to work on it would probably be easier to reassemble it at a different origin.

The text editor is entered from the main MAXAM menu and really deserves a review all of its own. It works in both modes 1 and 2, allows infinite line lengths and updates the screen very quickly. The really novel part is that being in ROM it leaves nearly all of the rest of your memory free for text, usually some 40K after your disc, Arnor and BASIC ROMs have had their pieces of workspace, in fact this article was finished on the Arnor editor because I ran out of room in Amsword. With the Arnor editor I still have some 28 K left but I probably will not use all of it.

The editor allows text to be entered in insert or overwrite mode and you can join, insert or delete lines easily. The cursor will only move only over text and so tends to return to the left margin if it is moved over a blank line. This is fine for a word processor where you mostly move around in paragraphs but not so good when you are trying to construct tables of data, however the tabs can be set to any position on a line and make life a bit easier for this.

There is a status line at the top of the screen showing how much memory is left, the current cursor position (column and line number) and your insert , caps or shift lock status. It is also used for the occasional error message together with the obligatory beep.

Text is displayed in the current screen mode and is not limited to the displayed left and right margins. In fact you can have lines as long as you want but the editor slows down noticeably after about 200 characters. If you write lines that long you ought to be writing for "Amstrad User", not programming in assembler.

You can define blocks of text to be copied, moved, deleted and modified using the shift, copy, delete and clear keys. Defined blocks are shown with the first and last characters inverted and copies are checked first for sufficient memory. Defining the start or end of a block causes another beep.

Movement to top and bottom of the file is very quick and a command is provided to position the cursor at a specific line number. Very useful considering the amount of text you can hold in memory at one time . The cursor keys also move you around page or line at a time, to the start or end of a line and to the top or bottom of the text.

Blocks , or the whole text , can be modified using a command from the main menu. This enables a block of assembler or a BASIC program to be line numbered, put in single quotes, stripped of line numbers or stripped of quotes . It can also be used to print assembly listings with numbered lines.

The main menu provides commands to merge text, print text , find text , find and replace, assemble, CAT your disc or tape and alter your tabs . If this is their editor I wait with baited breath for their word processor.

On the whole this package is well worth the money. Mostly because of its miserly use of memory but also because of the excellent editor and debugger. This is the first add-on ROM for the CPC464 and it deserves to succeed.

■ See The special offer on page 62 ■



If you have any interest in machine code you are bound to want one of the new Maxam assemblers from Arnor. If you don't you obviously haven't read the review on page 58. The Arnor ROM board plugs into the back of the Amstrad CPC464 and comes complete with the Maxam assembler. This provides a simple way into machine code, either as a true assembler or by allowing you to use in-line code.

The system costs £59.95 what could possibly be better? How about a reduction of £10. Readers of Amstrad User can save their pretty picture of Florence Nightingale and buy this great little device for only £49.95. You can then settle down, write a best-selling game and earn a fortune.

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WIN A SINCLAIR C5



Knight Lore is a remarkable game and Ultimate are a remarkable software house. They are also very generous and have offered to give one of our readers a Sinclair C5 electric vehicle. These have a top speed of 15mph and run both on pedal power and an electric motor. There will be various runners up prizes of Ultimate - Play the Game hats and sweatshirts (I had to buy mine -Ed). All you have to do is design a new room for Knight Lore. You don't need to do it on a computer, a pen and paper will do. Just look at the pictures on page 68 and see the kind of things which appear in the game. Remember that you have an extra colour to play with on the Amstrad.

ULTIMATE PLAY THE GAME

Official Competition **Entry Form**

AMSTRAD COMPUTER USER

Name ....

Address ....

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Rules:

1. The winner will be the first correct entry drawn on June 28th 1985.
2. There is no limit to the number of entries any individual can make, however all entries must accompanied by an official entry form; photocopies are not acceptable.
3. Entries should be sent to: Ultimate Competition, Amstrad User Magazine, 169 Kings Road, Brentwood, Essex. CM14 4EF
4. No correspondence can be entered into regarding the competition. Entries cannot be returned.
5. The judges' decision is final. No employees of Amstrad, Amsoft, or Amstrad User, nor their relatives may enter.
6. All the room designs become the property of Ultimate Play the Game.

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Five impressive print styles for your use

COMPACTA - bold and heavy, good for emphasis
DATA-RUN - A FUTURISTIC SCRIPT
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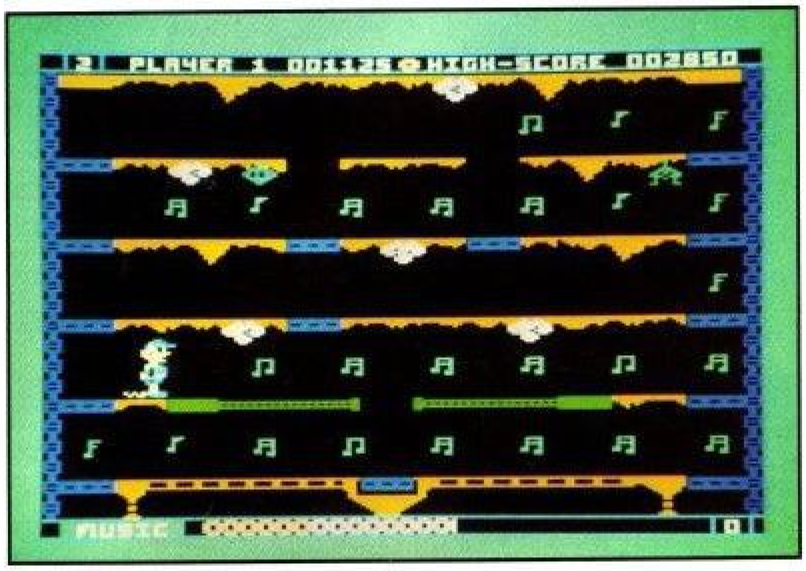
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SOFTWARE REVIEWS

Jet Boot Jack



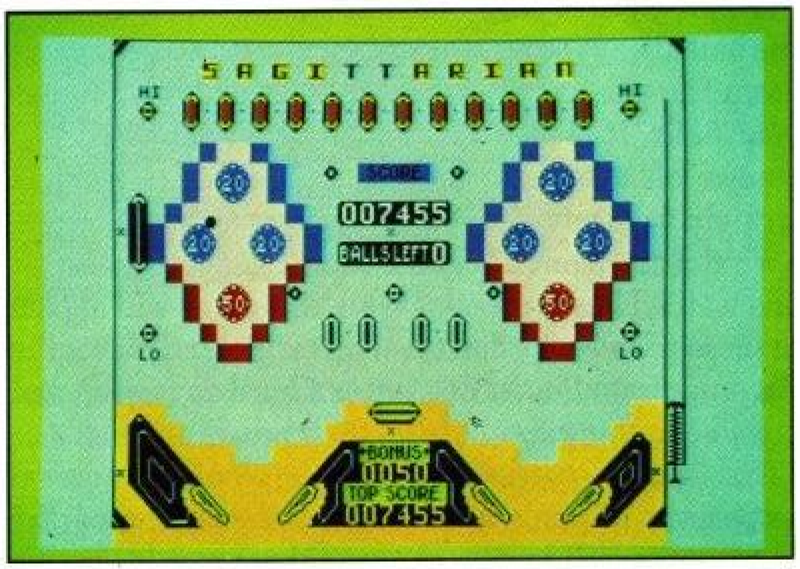
Jet Boot Jack is quite a novel idea for a game, although it is probably what most people would call a platform and ladders type of game. Your multi-coloured character consists of a reasonably large sprite, an amiable little chap. His purpose in life is to fly around collecting musical notes, each scoring him points and giving a melodious ping into the bargain. Projecting rocks in the roof can prove fatal, but may be avoided by instructing Jack to lower his head - pressing the fire button as each is approached.

Transport between levels is accomplished by one of several lifts on each screen, care must be taken not to enter one as it is moving, this is also fatal. Some of the platforms consist of 'conveyor belts' and may drag Jack towards one of the rocky bits of ceiling - care is therefore necessary to dip his head at just the right moment. Another type of aid to movement is the horizontally moving platform that may only be embarked upon when it is at rest. This then moves Jack across to another stationary piece of platform. There is no time limit, however, fuel is used by Jacks Jet Boots, this may be replenished by picking up one of the fuel pods that hang from the ceiling. It is unwise to collect too much though, because those remaining will count towards the bonus upon completing a particular screen. With practice, it is possible to move quickly around the screens, which produces a very simple tune as each note collected produces its sound. Five lives are available, but on losing the last, you then have the opportunity of starting on any of the screens that you had completed up to that point. The above describes the game in its practice mode - when you think you have gained sufficient control, the game can then be played with all sorts of nasties dangling from the ceiling.

This game proved to be extremely addictive and the ability to pick starting screens once that screen has been completed means that you aren't always stuck with the very first screen. Although there are only 10 screens, each made of similar elements, each has a character of its own and the detail makes up for the lack of number. The figure that you control is not just another boring single colour UDG, but is multi-coloured and well detailed, making it a pleasure to drive him about. The control is pixel accurate and very responsive - all round a very enjoyable game and well worth considering.

AUTHOR:	English Software
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	***
PLAYABILITY:	***
ADDICTIVENESS:	***
OVERALL:	***

Pinball wizard



This is the best simulation of pinball I have seen on any machine yet. It is produced by CP Software and all their graphics are in mode 1 with a change of colours half way down the screen. The ball moves smoothly and does not flicker, this is important since the ball can fly around at quite a clip. Each game starts off with a title screen and a burst of 'Colonel Bogey'.

The game has the usual 'bonus score when lit' bumpers, which you light up and turn off by hitting small posts. It is, of course, far easier to turn them off!

As on the real thing the bumpers don't give an extra push to your balls if they hit at a very shallow angle or slow speed.

There is a row of letters, which spell the word 'sagittarian', to be lit along the top of the screen for bonus points. These are fairly easy to pick off with careful use of the plunger and your five balls. (Thats if you have had a lot of practice - Ed)

The balls fall around as if under the influence of gravity and those tiny imperfections found only at crucial points on the decks of pinball machines. Rebounds are sufficiently random to be realistic but random enough to stop your balls from getting stuck on the same path. The ball never actually stops moving! Try catching it between your flipper and the wall and watch it try to wriggle away.

You have two sets of flippers, one pair on each side of the table. They are controlled by the '\' and 'Z' keys, your plunger moves backwards and forwards with suitable sound effects when you hold down a shift key and clouts the ball when you release. No joystick option , but you don't really need it.

Sound effects are similar to the real thing : bells, chugging noises, click of scoring mechanism and so forth. When the game restarts your score seems to mimic the rotating scoreboards as found on the old machines. This has become increasingly popular recently in arcade games which is surprising as not long ago designers were frantically putting digital scoring mechanisms in their machines.

The program is annoyingly realistic in the way that the ball always seems to head for those little channels down the side which give you 1000 points and keep your balls. It is also not unlikely that your ball will bounce off a bumper at you, you hit it, it bounces straight back and so on until you miss it. Unfair I say !

What is the point of a game where you mostly just sit and watch I hear you ask ? Well, this game will appeal to those people who don't feel up to "Roland Meets the Greenies from Planet Zog" after a hard days work and fancy something simple to let their minds unwind.

This game scores over the original in several respects; you don't need coins, you can choose the speed of the ball and there aren't three people leaning over the table.

The only problem is that you can't tilt the thing !

AUTHOR:	CP Software
FORMAT:	Cassette
PRICE:	£6.95
GRAPHICS:	****
PLAYABILITY:	****
ADDICTIVENESS:	*****
OVERALL:	****

Game of the Month

Knight Lore.



This review is really difficult to write. How do you describe software which is so good that it makes Jet-Set-Willy look feeble?



Ultimate Play the Game are to programming what the Beatles were to pop music. They can't put a foot wrong. Every release is destined for number one in the software chart before a byte is coded. Every set of computer awards features Ultimate as the winners of something. They do not seek publicity but they get it.

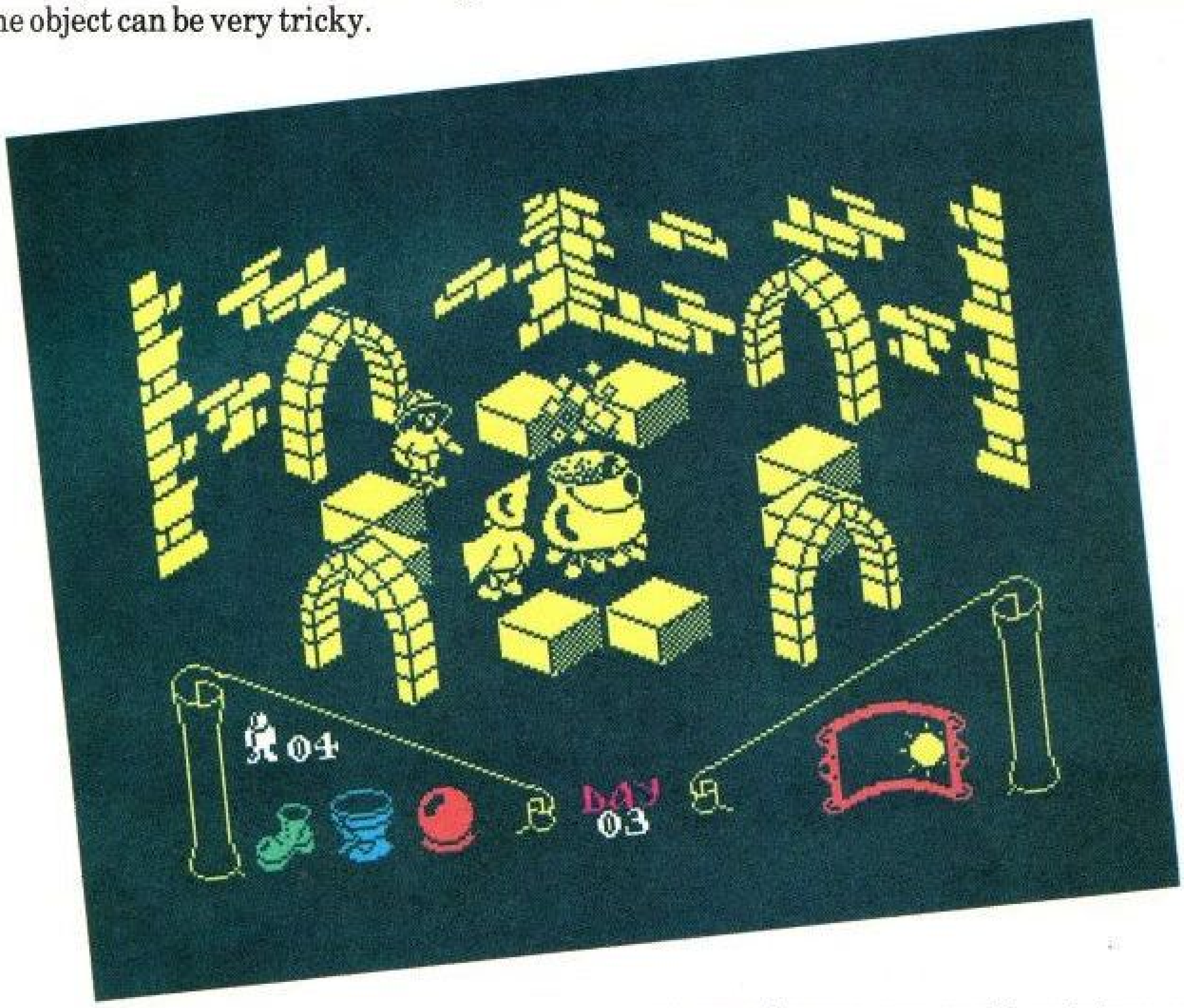
Knight Lore is the sequel to the program 'Sabre Wulf'. This did not appear on the Amstrad but took the form of a 2D maze game where the player had to hack his way through a jungle and destroy a monster by finding four segments of an amulet. One of the monsters in this game was the 'Wulf'. In Sabre mans' quest for the amulet he gets bitten and in Knight Lore he gets turned into a werewolf every night. In Knight

Lore you take the role of Sabre man, your task is to roam around the Wizards Castle and find the ingredients necessary to cure yourself of this dreadful spell.

Somewhere in the castle is the wizard and his magic cauldron. This needs the items found in the castle in a particular order. The item the cauldron wants is shown amongst a mass of flashing stars. If you are not carrying it (and you can only carry three things at a time) you had better leave the room quick since the stars will attack you. To rid yourself of the 'Wulf's' curse it is necessary for you to put all the right objects in the cauldron. This means that you will need to find, and obtain the objects. The castle is no small place and getting to the object can be very tricky.

Editors Confession.

We know that we can't pull the wool over the eagle-eyes of "Amstrad Computer User" readers so we are going to own up. The pictures you see here did not come from a CPC464. Because of the tight deadline we work to we had to use the Spectrum version of Knight Lore for the pictures. Sorry. The Amstrad version is, of course, much better. Each room uses three colours in the place of the two you see here and the hazards look even nastier. The graphics have been re-worked to take full advantage of mode 1. Whilst loading a beautiful replica of the packaging is displayed.



What I have so far omitted to say is that each room is shown in stunning 3D. As you will see from the photographs this is no simple ladder and platform game. There are platforms which rise and fall, move left and right, but they also move back and forth. When you walk around a room you actually walk *around* it. Every object is beautifully drawn. There are brick walls, stone pillars and forest walls. The monsters take a variety of guises, from ghostlet blobs on the floor to sentry guards and nasty rolling balls. Some places have moving platforms which are the only way you can get across a room, some are filled with spiked balls. Controlling Sabre man to the nearest pixel is an essential skill. One important trick to learn is how to drop and stand on an object so that you can jump over a wall and then, whilst jumping, pick up the object so that it is not left behind. The game is full of tricks to learn. You constantly change from Sabre man to werewolf and some hazards are easier in one or other guise. At £9.95 this software is a bargain.

Even if the fear of werewolves has never kept you awake at night this game will hook you until you rid yourself of the curse.

AUTHOR	Ultimate
FORMAT	Cassette
PRICE	£9.95
GRAPHICS	*****
PLAYABILITY	*****
ADDICTIVENESS	*****
OVERALL	*****

Sir Lancelot



As with many of the other popular home computers, platform and ladder type games seem by far the most abundant. Sir Lancelot is yet another game of this type. Having loaded, you are presented with a multi-coloured title screen across which scrolls the usual sort of inane message. Hitting a key will then take you to 'Merlins Magic Teleport Chamber', where, by picking up any of the twenty-three visible axe like objects, you are magically trans-ported to one of the playing screens. As with most games of this type, the screens consist of, not suprisingly, solid platforms, and ladders, which may be used to gain access to the higher platforms. To hinder your attempts to pick up the five or six visible objects on any screen, there are the indispensable moving sprite characters, contact with which will invariably mean sudden death. Having got all of the visible objects, a final flashing one appears which, when touched, returns you back to the teleport chamber so that you may go on to a further room.

Unfortunately, that's all there is too it. This game is very similar to a lot of other games and to stand out would require some sort of novel touch - which, I'm afraid to say, it hasn't got. At one time, 23 screens would have made for quite an impressive game -however, by recent standards, this one is left trailing a little. That isn't to say that it has no redeeming features, indeed for someone who has never played a platform and ladders type of game, this one could be quite a good introduction. The ability to play any of the screens, without having to work through those that preceed it, is quite a bonus. The time limit that is set for each screen (shown by a count down from 999) does appear a little short and will hinder novices while just proving an irration to old hacks. A rather curious effect of not using interrupts to drive the sprites means that as lives are lost and the number of walking men falls, the whole pace of the game increases - however I think one could almost call this an unprogrammed feature. My attempts to transfer the game to disc were hindered slightly by an ingenious mechanism that can spot that the game has been copied and halts it displaying the word PIRATE - this is relatively simple to stop, but quite ingenious none the less - shame the rest of the game were not so innovative.

AUTHOR:	Melbourne House
FORMAT:	Cassette
PRICE:	£6.95
GRAPHICS:	***
PLAYABILITY:	****
ADDICTIVENESS:	***
OVERALL:	***

Jammin



With a name like Jammin you could expect this game to have some connection with music and sure enough it does. This is fine if you happen to enjoy the merry tunes which accompany our hero Rankin' Rodney on his misadventures, if not then its a case of bad luck because this game revolves totally around music.

The plot is simple enough - guide Rodney around each screen by means of a series of multi-coloured conveyor belts retrieving the scattered instruments one by one and returning them to the centre of the screen. As each instrument is retrieved the rythmic pulse is changed but beware bumping into a 'bum note' will add a nasty discord if it gets you.

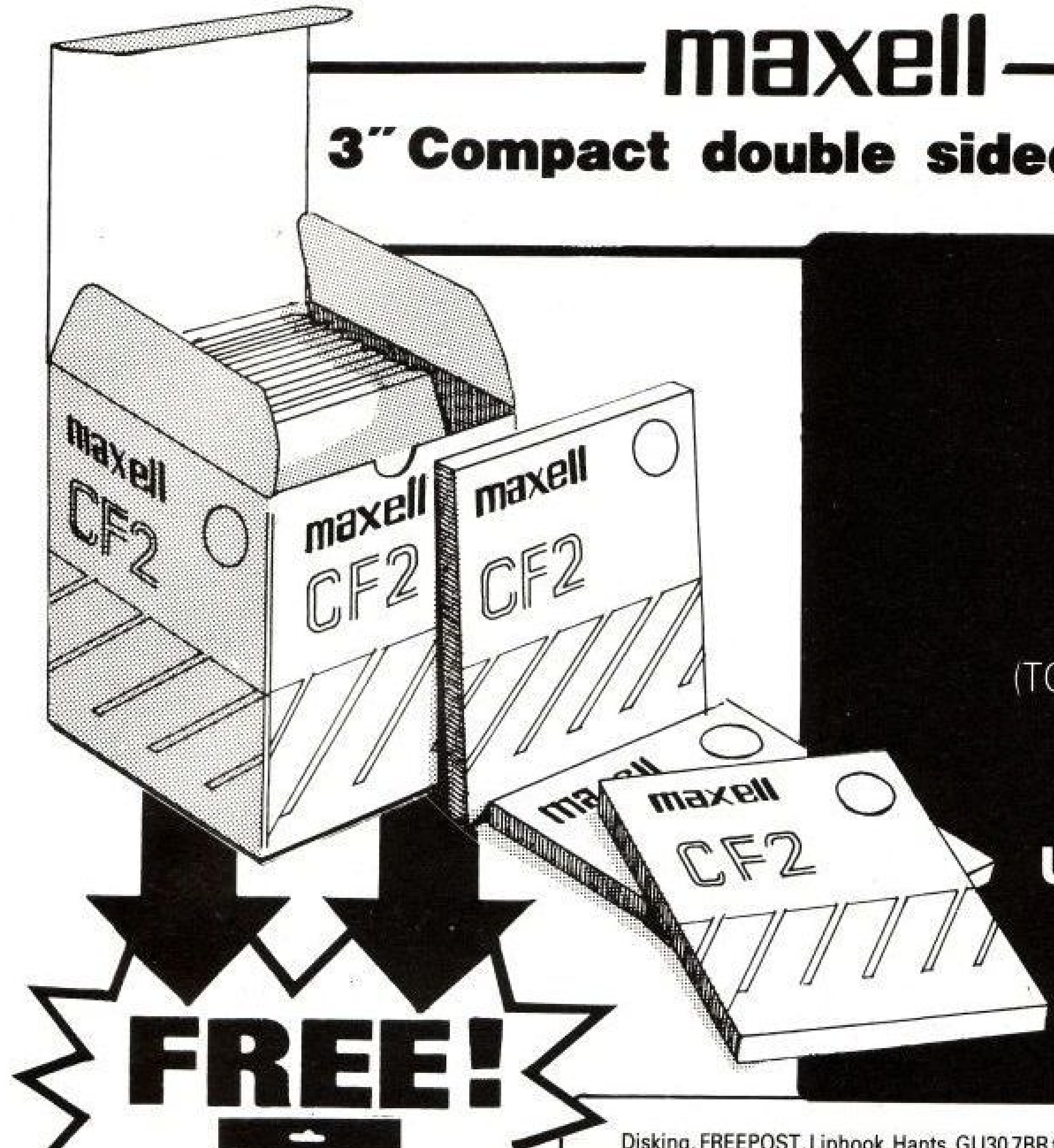
Sounds easy, but hopping onto a platform of the right colour requires alot of concentration and since the screen is ablaze with flourescent colour after a while not only does the head start to spin but the eyes as well!

AUTHOR:	Task Set
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	**
PLAYABILITY:	**
ADDICTIVENESS:	**
OVERALL:	**

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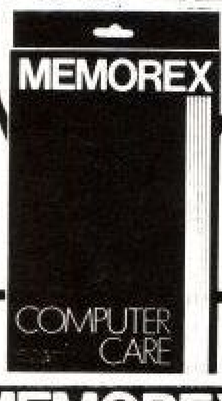


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The CP/M User Group

by Andrew Clarke

I was looking through an old computer magazine from 1979 the other day whilst clearing up. I was about to throw it out but I started instead to thumb through it. It was printed in the year that we founded the CP/M User Group (UK) and I was struck, whilst reading it, how much had changed since those days. The 8088, which was to form the basis of the IBM-PC, was just beginning to appear on micros, though the 8080 was still prevalent. To buy a disc-based computer in those days cost a lot of money - well over the equivalent of £2000 in today's terms. The computer press were completely ignorant of CP/M beyond repeating that it was a 'good thing'. I suppose I was typical of the amateurs who came across CP/M, and fell in love with its simplicity and ubiquity.

I scraped together enough money for my own home computer, not only one of those ridiculous Nascom 1s, but a big S100-bus system with an eight-inch drive and as much as 16K of memory. Less privileged souls than I had to be content with 8K but CP/M would not run properly in less than 16K. When the postman arrived with my computer, I unwrapped it with enormous excitement, and the whole lot was laid out around the dining room. I then began to wonder, with rising panic, if it had all been a colossal mistake. Empty PCBs, spools of wire and tubes of chips are a daunting sight, especially to one who had splashed out £1600 for something that might never work. With help, the whole awful mess was transformed into a computer, and after a couple of months of labour, and agonising difficulties, the 'A>' prompt appeared for the first time on the screen. It is difficult to describe to anyone the excitement of seeing a computer that one has laboriously soldered together bursting into life, but any fellow hacker will know what I experienced. The computer, 'Big Think', has worked happily and reliably ever since, and as I write this, is whirring away in the corner, still running CP/M 1.4, and still with only one drive.

Unfortunately, the excitement of typing DIR, fiddling with DDT, and attempting to disassemble STAT soon palled. My computer was not just an expensive toy but had to do a job of work. The purchase of the hardware had cleaned out my financial resources and so the resulting micro was quite bereft of software. Fortunately, this was not a real drawback. CP/M was, indeed, a software bus, and there was even then a large amount of free public-domain software about. In those days I had to buy it from the importer of my machine in Swansea, nearly forty 8" discs full of exciting and interesting stuff, which formed the basis of the group's present software library that we distribute to our members. If it had not been for those first library volumes, I would still be staring disconsolately at a blank screen.

I grabbed greedily at what was going. Even if it didn't all work first time, I learned a great deal and I have never forgotten the advantages of having the source code to the programs I used. I feel I owe a great debt to the people who gave their code to public scrutiny. I immediately had utilities, games, BASICs, ALGOL, STOIC, assemblers, disassemblers and a great heterogeneous mass of unsorted software. It was magnificent, and I was able to use STOIC to complete a piece of research that I was doing at the time. 16K, which had seemed an imponderable immensity at the time, ran CP/M and BASIC-E perfectly well, but seemed a bit cramped as program size increased. When I increased to 32K, I felt that I would never be able to fill it. In contrast, I now have an awful IBM-type of machine which runs Concurrent CP/M and fails to load Wordstar in 256K - anything less than 512K feels cramped! I never lost my gratitude to the host of American programmers that contributed their software to the CP/M User Group Library, and thereby helped me, and so many others to get started with microcomputers.

Most people who come across the CP/M user group seem to find it rather surprising that here is a group of CP/M users trying to give away as much software as they can to as many people as possible. The CP/M User Group in the States is long-since defunct but we in the UK have continued to thrive. The UK CP/M User Group is going strong and has issued 24 volumes of UK software. The Journal has gone to fourteen issues and we have organised seminars and local groups.

The number of discs has increased from 36 to 400

(thats 90 megabytes) and it would take all one's time to survey and review the flood of software being donated. We are still collecting as much public-domain software as possible from around the world into a library for distribution to group members. This software comes from many sources, mainly from the States, and includes those early volumes that got me going with my first micro. It represents a huge amount of code and its quality varies from the excellent to the dubious, just like any form of human endeavour. In the main though, it's well worth the cost of the medium. There are accounting packages, games, operating systems, graphics packages, communications packages, computer music systems, utilities, languages, adventures, C Compilers, Forths, Pascals, BASIC interpreters, macro processors, print formatters, Music programs and and a huge assortment of stuff that defies classification! Just because it is free doesn't mean that it is sub-standard, and much of it is better than the average commercial package. It is just the documentation and polish that is generally uneven.

People give programs for public distribution for a variety of reasons. For some, it is the result of a 'frustrated export order', a software house that goes belly-up, or a visionary mission to provide the impoverished user with quality software for free. A great mass of software results from the legal requirement for American universities to place their work before the general public for their benefit, and some software is given to the public domain by companies who find that they benefit from their free 'tasters' being given wide distribution.

Amateurs are often particularly generous in giving programs. Many hobbyist 'hackers' get great pleasure from giving their work and receiving the work of others. These 'hackers' generally seem to work in the industry and rush home at the end of the day to make a hobby of their profession. Many of these professionals are keen that poverty should be no bar from enjoying using good software, and one finds a most laudable wish amongst them to make their work as widely available as possible.

I have enjoyed collecting free software. I have a great number of the Stateside volumes from CP/MUG and SIG/M. Some of the code is excellent; For example, the languages BASIC-E, STOIC, ALGOL-M, FigForth, PPCPascal, Small-C and BASIC5 are useful to anyone. Obviously, there are several bits of chaff, often the proud first attempt of a blushing hobbyist, but there are very few discs that contain nothing of use (except the complete Yale catalog of bright stars that slipped in somehow!). I constantly use most of the library volumes for reference as I am humble enough to think that someone has written better code before me, and busy enough not to want to write code that has already been done.

Some of the worst programs are games in BASIC. With the exception of MegaTrek, the huge star-trek that is notable for its bulk rather than its quality, the BASIC games are not worth having. 'Adventure' (written in Fortran or C) on the other hand, should be on every machine.

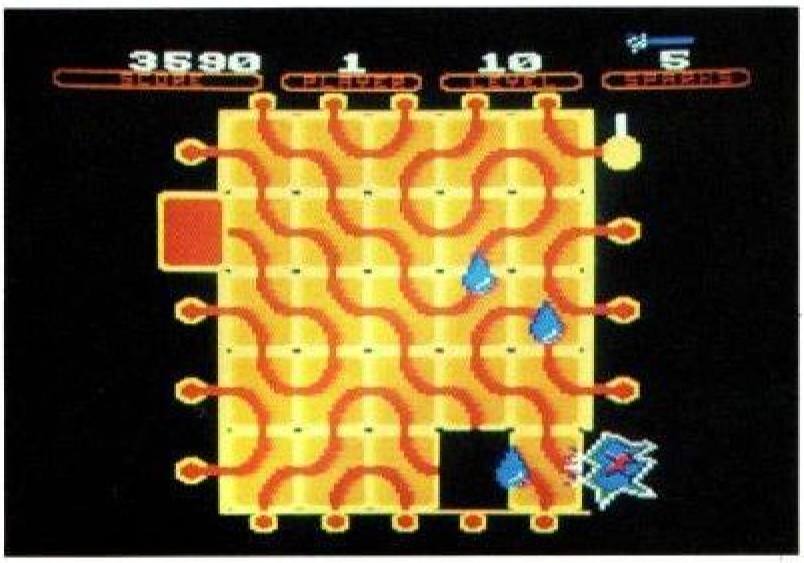
The British have provided relatively little; the sheer volume of Stateside code dwarfs our public domain offerings. The CP/M User Group (UK) now has over twenty volumes. In places, the quality of our efforts makes up for the lack of quantity. We appear to specialise in the improvement of public domain software, rather than its creation. The 'UK Z80 assembler' is a very popular reworking of an old classic from the CP/MUG library; so is UKM7, the rewritten modem utility. Richard Russell's Music program is by far the best one ever produced for a CP/M machine. Our weakness is in the extreme reluctance of our universities to part with anything, together with the asinine restrictions of Crown Copyright. Our contributors are almost invariably amateurs and lone 'hackers'.

Obviously, there is a limit to what the average person would want. I am sometimes asked what part of the library is indispensable, and there is even talk of producing a 'greatest hits' volume of CP/M software. Beyond such obvious candidates as UKM7, Adventure, Resource (a disassembler) , DU, D (the fancy directory lister) or Z80ASMUK, it is hard to pick out the best of the library. One of my great pleasures is to explore forgotten corners of the library and discover, for myself, forgotten masterpieces of code, or playing with an obscure language or preprocessor. The library is such a mix that there is plenty for all tastes. It really represents the sweepings off the floor of the microcomputer industry, and there are plenty of diamonds in the dust.

I recently got my 'Amstrad'. It is not exactly in what the pundits call the 'leading edge of technology', but even so, my poor old 'Big Think' looks pretty inferior next to it. The Amstrad is, however, a very serviceable CP/M machine and the operating system is perfectly satisfactory in a one-drive environment. (as long as you have FILECOPY.COM or MFT.COM from the UK library). All those volumes of software will run, and there should be great fascination in exploring the huge mass of software that is around, and discovering useful and interesting programs. Whilst using my Amstrad, I keep wondering what it must be like for the person just starting out with CP/M on this machine. Without access to the huge mass of software available to run under CP/M 2.2 one must wonder what on earth the use of the operating system might be. The answer is simple, join the CP/M User Group (UK) and find out!

CP/M User Group (UK),
72 Mill Road,
Hawley,
Dartford,
Kent DA2 7RZ

Confuzion



Confusion is an arcade style game of fast reflexes and quick thinking. It uses an original game concept, making it very difficult to describe. It can't be called a Pacman variant or a Defender clone, but in the future we may be able to describe games as Confusion variants.



What is the original format that Confusion uses? The basic aim of the game is to explode a number of bombs by guiding a spark to ignite them. The spark travels along a track laid out in sections on a collection of blocks. The blocks are moveable like the blocks in a sliding puzzle, the type of puzzle where there is a square missing and the pieces are shuffled round. As the spark travels, a fuse at the top of the screen burns down, creating a time limit in which all the bombs must be exploded. The player has to manipulate the blocks, forming a route between the spark and one of the bombs. At the lower levels of the 64 levels of play, you start with less blocks on which to move, less bombs to explode, and fewer droplets. Droplets travel along the tracks and will extinguish a spark if they collide.

The presentation of the game is very good. For example there is an excellent demonstration of various techniques for juggling blocks. After every eighth level there is a bonus sheet to play and after every fourth level you gain an extra spark. It is possible to start a game at a choice of 6 levels and also to restart a game at the level you managed to reach. Play is by joystick or keyboard. It is possible to redefine the keys although the cursor keys should suit most people. The joystick, is used to pull a block into an empty space in the grid, creating another empty space. So the direction you wish the block to come from, is the direction you move the joystick in. This is a difficult skill to develop so an option to reverse the action of the joystick has been included. The fire button on the joystick has the effect of speeding up the travelling spark and this is useful if you are certain that you have the correct route mapped out. The graphics are quite good, movement is very smooth and all the pieces are large and clear. I think there will be a number of people who will become Confusion addicts but not everyone will enjoy playing it. It is very difficult to do the mental calculations, to move the blocks into the correct positions, at the speed the game requires. Simple fast reactions are no good for this game, you need to know what you are doing. On the other hand it is possible to 'learn' a screen and complete it every time. So if you enjoy games that need good timing and specific moves you may enjoy Confusion.

AUTHOR:	Incentive
FORMAT:	Cassette
PRICE:	£6.95
GRAPHICS:	****
PLAYABILITY:	****
ADICTIVENESS:	*****
OVERALL:	****

Spook Loot.



Roughly speaking there are two kinds of software sent into Amstrad User for review. The first is the usual, commercial software. The Jet-Set-Willy type program, written by an established software house with a good professional feel. The second type is

home-brew software, often written in Basic. These programs lack the finish of the professional product. Spook Loot falls somewhere between these two. It is certainly not the product of a major software house, however it is too good to be relegated to ranks of the dabbler in the software industry.

The program comes from the Essex based Andtronic. With this address it would be nice to think that the game is the result of some moon-lighting by an Amsoft programmer, however it is not good enough for that to be likely.

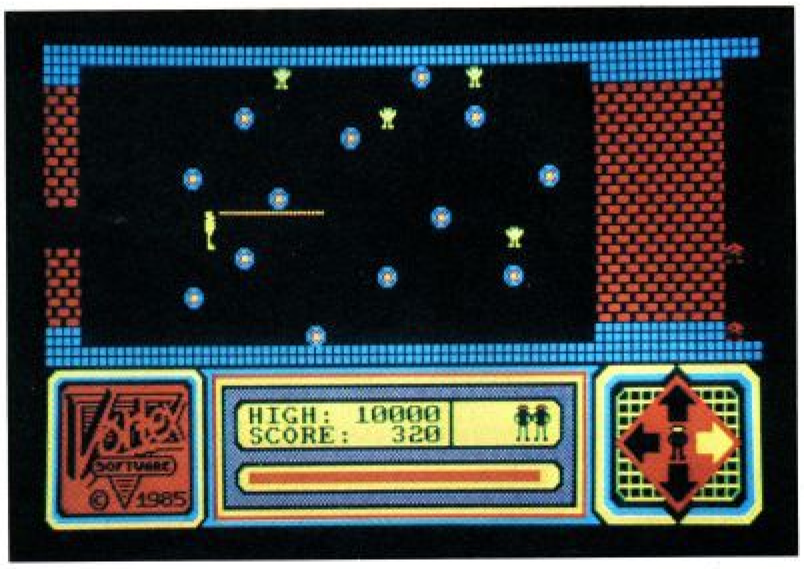
Spook Loot takes ages to load. This is because each block is saved as a separate program. The programmer has done this to allow himself the time between blocks to print a "please wait" message. The program is big. There are 160 rooms and a variety of nasty sprites. These materialize as you enter each room, although on reading the inlay card you discover that they are supposed to be climbing through trap doors. The poem and description on the inlay card mimics the style of Ultimate. The programming falls far short. Once loaded you discover that the program is of the usual 'run round the maze and zap the nasties' type of program. Some of the aliens are pretty and the use of colour is quite good but the game somehow lacks something. It could certainly do with some music and the movement is jerky, the lack of diagonals on the joystick control is quite frustrating. Perhaps I am being too hard, aiter all it is a commendable effort but I wouldn't buy it.

AUTHOR	Andtronic
FORMAT	Cassette
PRICE	£7.99
GRAPHICS	***
PLAYABILITY	***
ADDICTIVENESS	**
OVERALL	**

Android One



If you were looking to catergorise Android One, I think it would probably be described as a maze game. The idea is that with the aid of five robots (5 lives to you or I), you must blast your way through 15 screens to the nuclear generator, detroy it, then return to base. Brick walls prevent progress and must be blasted out of the way, as must any one of the four types of aliens that are also trying to stop you. Each of the screens appear quite different and may be populated by just a few or possibly great hordes of the aliens. Your blaster does not have that great a range, so that you need to get quite close to kill an enemy - another side effect of this is that sometimes you have to blast part way



through one of the wider walls then get into the gap and blast the rest of the way from there. Each of the four types of aliens act in differing ways - bouncers stick to fixed paths, but cannot be destroyed, groupies stay still most of the time, providing easy target practice, skaters race about and usually prove the most difficult to combat, the wanderers are very similar.

When first loaded, the first title screen, with the obligatory scrolling message, looks really well designed and it is hard to believe that it is only in four colours due to a nice use of stippling. The screen on which you choose keyboard or joystick has really nice graphic representations of each and the instructions are done really well in 80 columns in this 40 column mode. However, the characters in the actual game don't appear to be quite so well thought out - they're a bit too obviously 8x8 or 8x16 defined characters, rather than the lively figures that they could have been. Although the figures are moved pixel-wise, they can only come to rest on character boundaries, consequently, it is sometimes a little difficult to line your robot up in just the right place to increase the size of a hole in a wall that you're trying to blast. Death does seem to come a little to often and it is difficult to see how I could ever have made it to the end without the infinite lives POKE. I was hoping for some great ending on reaching the final screen, the effect was pretty good, but was it worth battling through 15

screens for? - I think not. In fact, once you have made it to the final screen, you just have to come all the way back to start over again, which could lose appeal very quickly. On the plus side is the fact that without the POKE, it could take you quite a while to get there. (Oh all right, POKE &6391,&937A,&939F and &93A0 with zero - but I'll leave you to work out how to get them in). As you progress the screen is scrolled to the left - a nice touch. On reaching the transporter, the current screen 'implodes' to present the next - this is a great effect. The sound leaves a lot to be desired.

AUTHOR	Vortex Software
FORMAT	Cassette
PRICE	£7.95
GRAPHICS	****
PLAYABILITY	**
ADDICTIVENESS	***
OVERALL	***

Millionaire



The first thing you notice about Millionaire is that it crashes very soon after it has loaded if you have a disc drive attached. So disconnect all the interesting bits of your system and try again. This time, you should get past the loading screen, of two buildings grazing in a field, and see a large telephone appear on the screen. The purpose of the telephone is unclear, except that it gives a reasonable imitation of a phone ringing. This screen tells me I have a home computer, on which I have written a program. I have five hundred pounds which I am willing to invest in my game and depending on the course of action I take and the decisions I make, I will either become a millionaire or go bankrupt.

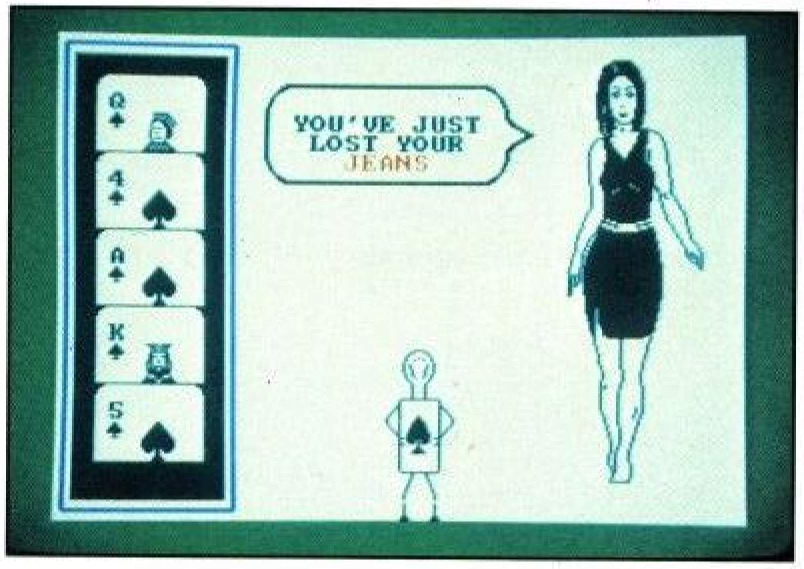
The game is basically the application of a new idea to an old format. There are two graphical bits to brighten up the boring old text. These are, pictures of your current dwelling, depending upon how you are doing, and a barchart showing how many peasants have died. Oops, I mean how many tapes you have sold. The sort of options that you have in the game are; how much you spend on advertising and duplicating. How many copies you duplicate and whether you put most effort into producing new programs or selling or converting existing ones. Being a one employee company, you cannot fire anyone, unfortunately, but you are allowed to wind up magazine editors. (Eh? -Ed).

Millionaire may appeal to budding software entrepreneurs or people interested in this kind of financial simulation. It is not the best example of this kind of program and you may get more enjoyment from one of the many games, that follow this format, that can be found in just about every computer publication from the year dot. The major fault of this program is, that it gives no information about how it arrived at the monthly sales result, making it difficult to adjust your decisions and improve your score.

According to this game, it takes exactly one month to produce a marketable program. I shall let you draw your own conclusions.

AUTHOR	Incentive Software
FORMAT	Cassette
PRICE	£6.95
GRAPHICS	*
PLAYABILITY	**
ADDICTIVENESS	**
OVERALL	**

Animated Strip Poker



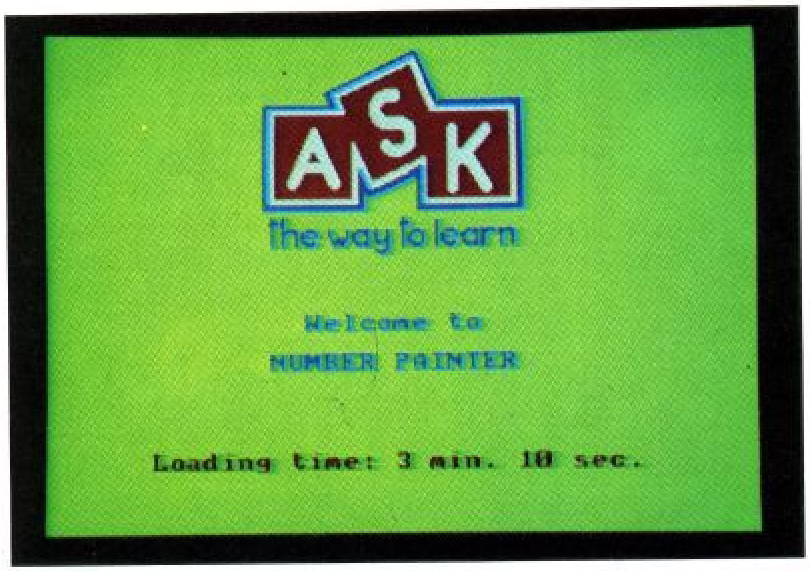
When I first saw an advertisment for strip poker in an American magazine I laughed and laughed. Now it is available on the Amstrad I think the program is more of a giggle. The rules are basically those of five card stud poker. You against the computer. However the computer is represented by a character called Mindy. Ossie, an Alice in Wonderland type playing-card, deals each hand. Once a player has

exhausted his (or her - should a computer called Mindy be called her or its?) funds you play for items of clothing. This is where the game hots up. One member of the user club staff spent the best part of the evening, staying after work to 'test' the program. Even without the strip feature I suspect the game would still be very compulsive. Yes "Animated Strip Poker" is degrading to women and it is tempting to run it down for this but the reaction of all the men who played it was so strong that this would be unrepresentative. The animation is limited, only the scene when the girl removes her dress is well done but this is very well executed. The movements are all natural and the effect is quite convincing, even if the result is disappointing.

The inlay card has been written for the Spectrum and needs some re-working on top of this the game has quite a few bugs in it. If you should win the program crashes when it asks you if you want another go and sometimes the screen scrolls when it should not. Worst of all the program once crashed in the middle of a game. Knightsoft claim that only 100 tapes have been duplicated with these bugs but I would like to see a corrected version before I was convinced. All in all a fun game.

AUTHOR	Knightsoft
FORMAT	Cassette
PRICE	£8.95
GRAPHICS	****
PLAYABILITY	***
ADDICTIVENESS	****
OVERALL	****

Number Painter



A.S.K. have been producing third-party educational software on popular micros for a few years now. Number Painter is the first release on their own label. The program is designed to test and build mental arithmetic skills of children in the age range 5-14. After trying the program with some 6-7 year olds I think the lower age quoted is a bit optimistic unless the children are particularly bright and perhaps 7-14 is the correct range. There are two options in the program, the Number painter game and a self-test section.



The Number Painter game is a 'girders and ladders' type game. At the start of the game you are given the choice of twelve levels of difficulty. There are four workmen you can choose from, Mr Plod is the slowest, while Mr Speedy is obviously on piece-work! A target number and starting value are given, you then have to move the painter around the screen and 'paint' the required numbers to reach the target. But watch out, if you take too long a bucket of paint will flood the site, also take care not to fall down holes in the girders otherwise you will get dizzy and all the numbers will be jumbled up. If two or more of your painters reach the target you go up a level, if none of the painters succeeds within the time limit you go down a level.

The self-test option, again with twelve levels, gives you a series of ten problems. If you type in the correct answer the painter nods his head and a painter is placed on the score line, otherwise the painter shakes his head and you are given another chance. If you cannot answer the problem within two trys then the correct answer is given and you move on to the next problem.

It is nice to see some more educational software available for the Amstrad. The graphics, although not up to arcade games standards, are still effective and colourful and the packaging well laid out and easy to follow. On a negative note the sound could have been used more effectively, and if found the game selection menu confusing.

AUTHOR:	A.S.K.
FORMAT:	Cassette
PRICE:	£8.95
GRAPHICS:	***
PLAYABILITY:	***
ADDICTIVENESS:	**
OVERALL:	***



3D LANDMARKS YOU CAN FLY AROUND

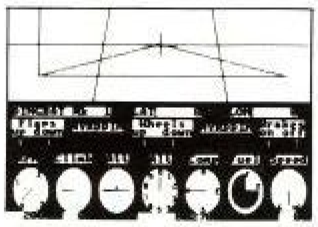
SUPERB REAL TIME SIMULATION

MYRDDIN FLIGHT SIMULATION

AMSTRAD CPC 464

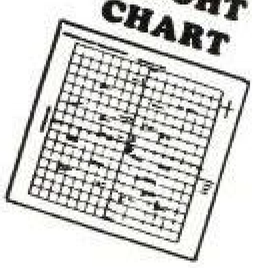


MANUAL

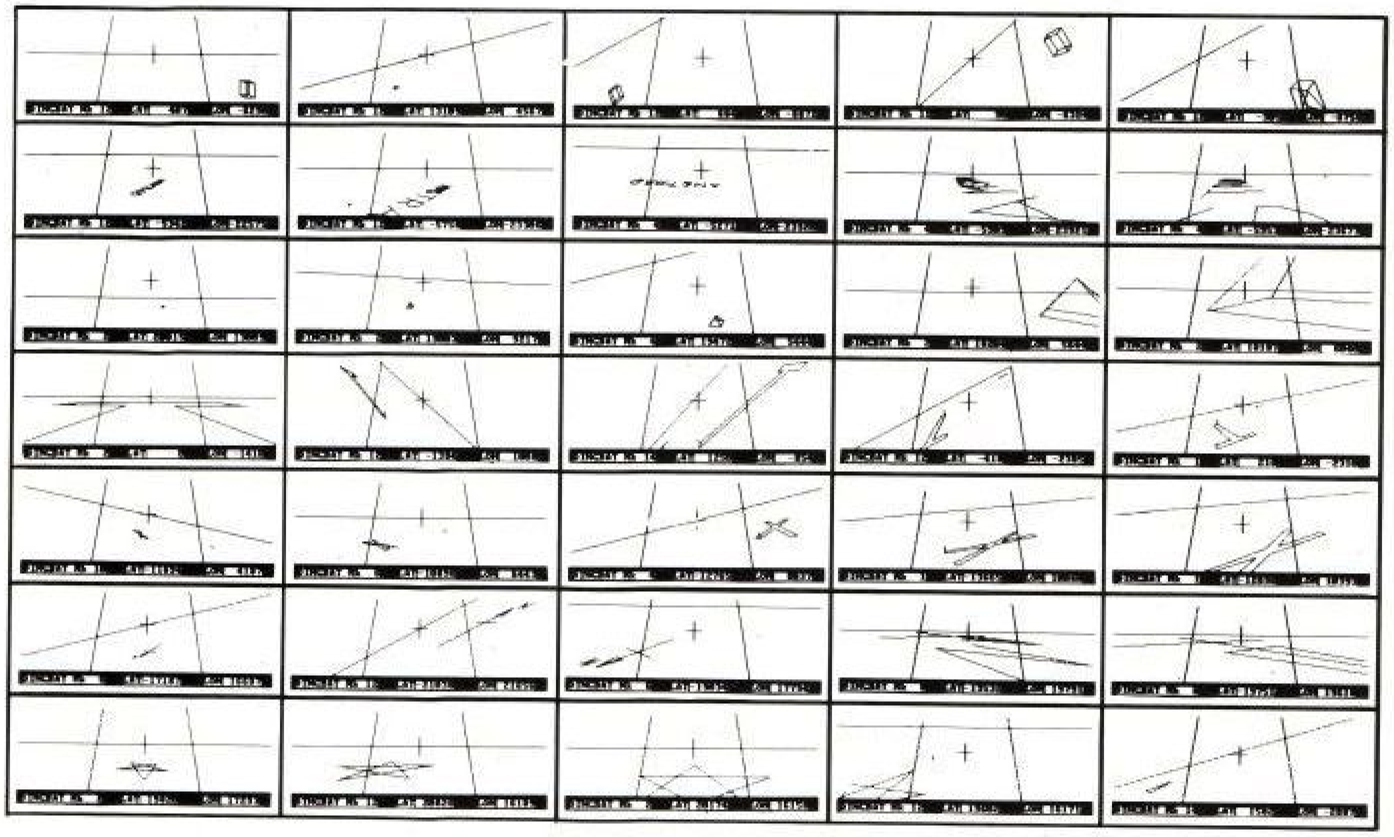


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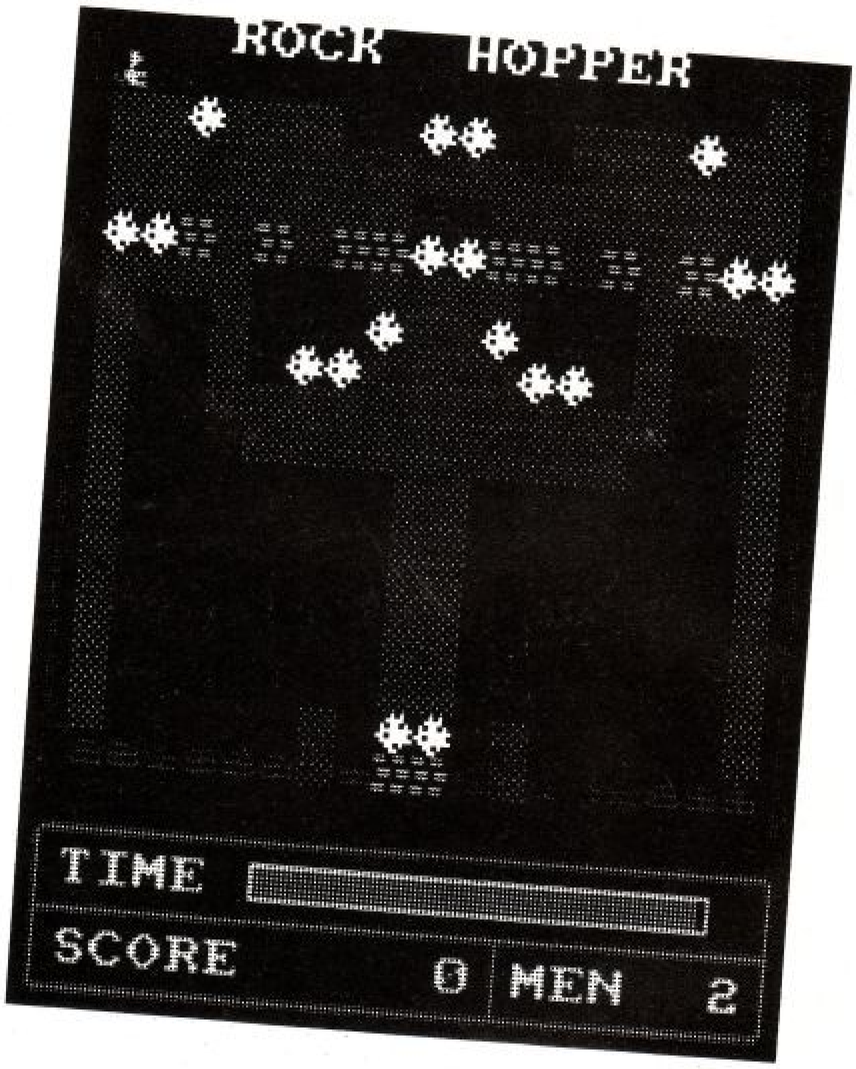
Rock Hopper

ROCK HOPPER is an arcade/strategy game in which Freddy (you), the small yellow hopper, has entered a system of ten caves to plunder all the treasures within.

The caves are highly unsafe and you must beware of falling rocks and (in later levels) poisonus snakes.

A rock will only fall if it has been disturbed. As you move you eat away the ground that surrounds you and you have to be careful not to trap yourself. You can fall from any height and to finish the board you must collect all the flashing treasures, before your time runs out.

To move Freddy use the cursor keys or a joystick. If Freddy gets stuck in a position which he cannot get out of you can start the board again by pressing CTRL + A (abort) - this also causes you to loose a life. (You start with three and get an extra one for every board you complete.)



Other keys are:

CTRL + G to end the current game.
CTRL + B to choose a board. (1 - 10 or 99) see BOARD DESIGNER
CTRL + L to load in a board. see board designer
CTRL + H to see a summary of the keys & functions.
CTRL + D to see a demo
CTRL + N to reset the computer.

Board Designer

This program is used to design your own boards to load into Rock Hopper.

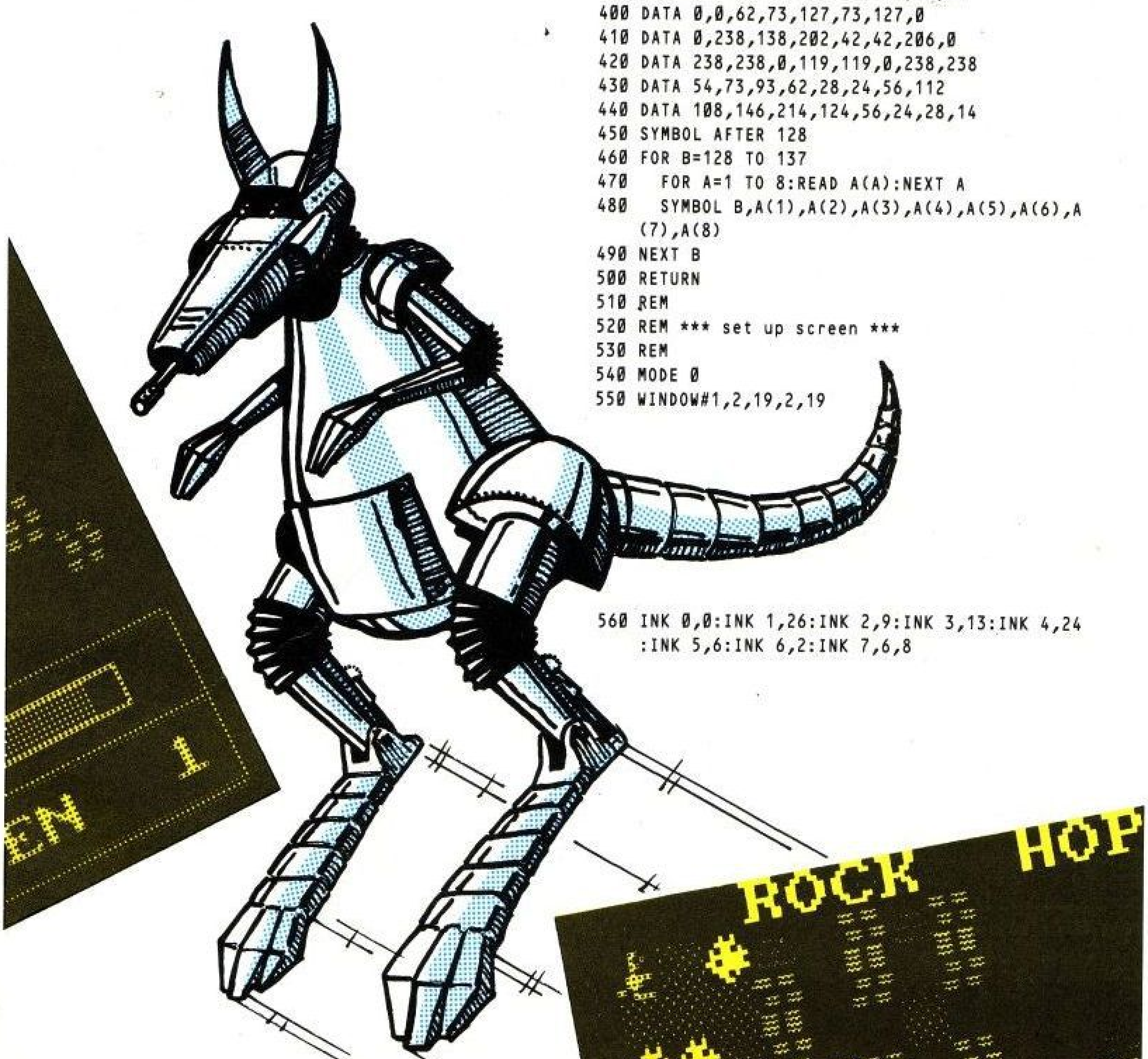
Using the cursor keys to move the cursor and keys 1-5 to place objects, you can design your own boards. Once loaded into Rock Hopper you can play the board by pressing CTRL + B then typing 99. A little thought has to go into the design of the board as it is easy to make one impossible to finish.

Happy Hopping!

```
10 REM ***************
20 REM Nick Stevens
70 REM ***************
80 MODE 0:BORDER 0
90 INK 0,0:INK 1,26
100 INK 2,2:INK 3,3
110 INK 4,9:INK 5,24
120 INK 6,6:INK 7,4
130 LOCATE 5,1:PEN 3:PRINT"ROCK  HOPPER"
140 LOCATE 6,3:PEN 1:PRINT"is loading"
150 LOCATE 5,25:PEN 5:PRINT"please  wait
    "
160 PEN 2
170 LOCATE 4,5:PRINT CHR$(194);STRING$(12,154);CHR$(195);
180 FOR a=6 TO 20
190 LOCATE 4,a:PRINT CHR$(149);:LOCATE 17,a:PRINT CHR$(149);
200 NEXT a
210 LOCATE 4,21:PRINT CHR$(193);STRING$(12,154);CHR$(192);
220 WINDOW#1,5,16,6,20
230 WINDOW SWAP 0,1
240 LOCATE 4,2:PEN 4:PRINT CHR$(164);" 1985"
250 LOCATE 6,4:PEN 6:PRINT"by"
260 LOCATE 1,6:PEN 7:PRINT"Nick Stevens"
    ;
270 LOCATE 6,8:PRINT"and"
280 LOCATE 4,10:PRINT"AMSOFT"
290 RUN"!ROCK HOPPER"
```

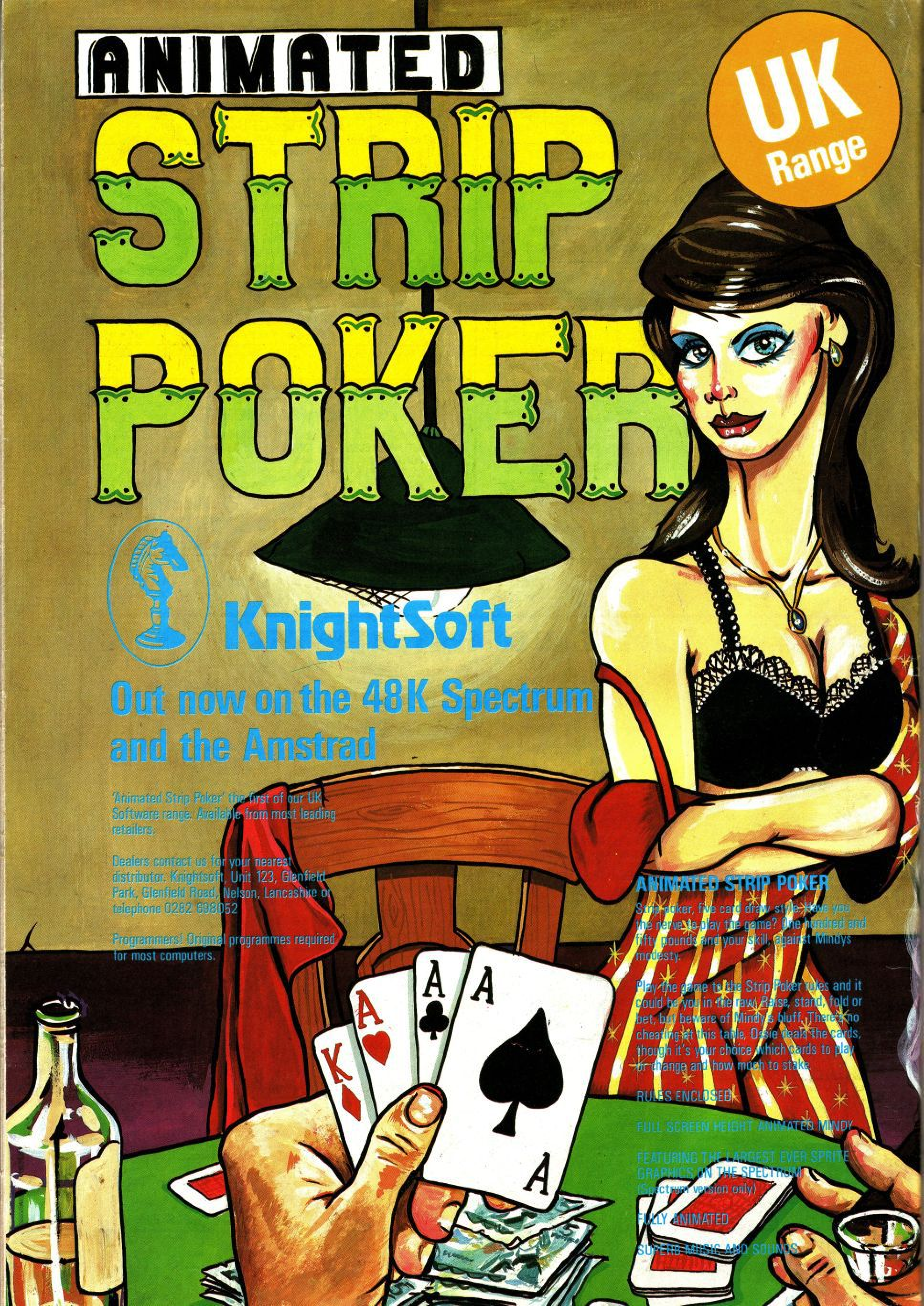
```
10 REM ***************
20 REM Nick Stevens
70 REM ***************
80 'POKE &BDEE,&C9
90 ON BREAK GOSUB 5630
100 ON ERROR GOTO 5640
```

```
110 REM
120 REM *** main loop ***
130 REM
140 GOSUB 330:REM *** set up UDG's  ***
150 GOSUB 520:REM *** set up screen ***
160 GOSUB 750:REM *** initialise    ***
170 GOSUB 3140:REM *** title screen  ***
180 GOSUB 860:REM *** set up board  ***
190 GOSUB 1210:REM *** start sound   ***
```




```
200 EVERY 70,1 GOSUB 1990
210 GOSUB 1330:REM *** read keys      ***
220 IF a=1 THEN GOTO 2900
230 IF a=7 THEN men=0:GOTO 2950
240 rr=0
250 GOSUB 1450:REM *** movement       ***
260 IF rr=-1 THEN GOTO 2900
270 GOSUB 2330:REM *** check rocks  ***
280 IF rr=1 THEN GOTO 2840
290 IF count>=max1 THEN 2060
300 IF t<194 THEN a=REMAIN(1):men=men-1:GOTO 2
    930
310 GOTO 210
320 REM
330 REM *** set up UDG's ***
340 REM
350 DATA 24,40,24,8,124,28,11,120
360 DATA 24,56,24,8,124,29,122,0
370 DATA 24,20,24,16,62,56,208,30
380 DATA 24,28,24,16,62,184,94,0
390 DATA 20,60,90,127,222,127,52,24
400 DATA 0,0,62,73,127,73,127,0
410 DATA 0,238,138,202,42,42,206,0
420 DATA 238,238,0,119,119,0,238,238
430 DATA 54,73,93,62,28,24,56,112
440 DATA 108,146,214,124,56,24,28,14
450 SYMBOL AFTER 128
460 FOR B=128 TO 137
470   FOR A=1 TO 8:READ A(A):NEXT A
480   SYMBOL B,A(1),A(2),A(3),A(4),A(5),A(6),A
    (7),A(8)
490 NEXT B
500 RETURN
510 REM
520 REM *** set up screen ***
530 REM
540 MODE 0
550 WINDOW#1,2,19,2,19
560 INK 0,0:INK 1,26:INK 2,9:INK 3,13:INK 4,24
    :INK 5,6:INK 6,2:INK 7,6,8
```

```
570 INK 8,10:INK 9,3
580 SPEED INK 20,20
590 PAPER 0:PEN 6:CLS:BORDER 0
600 LOCATE 1,1
610 PRINT CHR$(150);STRING$(18,154);CHR$(156);
620 FOR a=2 TO 19
630   LOCATE 1,a:PRINT CHR$(149)
640   LOCATE 20,a:PRINT CHR$(149);
650 NEXT a
660 PRINT CHR$(147);STRING$(18,154);CHR$(153);
670 PEN 5:PRINT CHR$(150);STRING$(18,154);CHR$
    (156);
680 PRINT CHR$(149);:PEN 4:PRINT"TIME ";STRING
    $(12,143);" ";:PEN 5:PRINT CHR$(149);
690 PRINT CHR$(151);STRING$(11,154);CHR$(158);
    STRING$(6,154);CHR$(157);
700 PRINT CHR$(149);:PEN 4:PRINT"SCORE      0";
    :PEN 5:PRINT CHR$(149);:PEN 4:PRINT"MEN  3
    ";:PEN 5:PRINT CHR$(149);
710 PRINT CHR$(147);STRING$(11,154);CHR$(155);
    STRING$(6,154);CHR$(153);
720 PRINT CHR$(22)+CHR$(1);:LOCATE 5,1:PEN 1:P
    RINT "ROCK  HOPPER";:PRINT CHR$(22)+CHR$(0
    );
730 RETURN
740 REM
750 REM *** set up variables ***
760 REM
770 DIM board(20,20),loadboard(20,20):hiscore=
    1000:name$="NJS"
780 SPEED KEY 255,255:KEY DEF 72,1,240:KEY DEF
     73,1,241:KEY DEF 74,1,242:KEY DEF 75,1,24
    3
790 board=1:men=3:score=0
800 x=2:y=2:t=568
810 m=130:n=136
820 count=0
830 SPEED KEY 255,255
840 RETURN
850 REM
860 REM *** set up board ***
870 REM
880 IF ff=-1 THEN board=0:GOTO 1000
890 ON board GOSUB 900,910,920,930,940,950,960
    ,970,980,990:GOTO 1000
900 RESTORE 3440:RETURN
910 RESTORE 3660:RETURN
920 RESTORE 3880:RETURN
930 RESTORE 4100:RETURN
940 RESTORE 4320:RETURN
950 RESTORE 4540:RETURN
960 RESTORE 4760:RETURN
970 RESTORE 4980:RETURN
980 RESTORE 5200:RETURN
990 RESTORE 5410:RETURN
1000 FOR a=2 TO 19
1010 FOR b=2 TO 19
1020 IF ff=-1 THEN GOSUB 1260:GOTO 1040
1030 READ c
1040 IF c=0 THEN board(a,b)=32
1050 IF c=1 THEN board(a,b)=207:PEN#1,2
1060 IF c=2 THEN board(a,b)=132:PEN#1,3
1070 IF c=3 THEN board(a,b)=133:PEN#1,7
1080 IF c=4 THEN board(a,b)=135:PEN#1,8
1090 IF demo=1 THEN a$=INKEY$:IF a$<>"" THEN d
     emo=2:RETURN
1100 LOCATE#1,b-1,18
1110 PRINT#1,CHR$(board(a,b));
1120 NEXT b:IF a<19 THEN PRINT#1
1130 NEXT a
1140 IF ff=-1 THEN max1=max2:gx=lgx:gy=lgy:RET
     URN
1150 READ max1,gx,gy
1160 RETURN
1170 REM
1180 REM
1190 REM *** start sound ***
1200 REM
1210 FOR a=198 TO 572 STEP 4
1220 PLOT a,50:DRAW a,60,5
1230 SOUND 1,700-a,2
1240 NEXT a
1250 RETURN
1260 IF loadboard(a,b)=32 THEN c=0
1270 IF loadboard(a,b)=207 THEN c=1
1280 IF loadboard(a,b)=132 THEN c=2
1290 IF loadboard(a,b)=133 THEN c=3
1300 IF loadboard(a,b)=135 THEN c=4
1310 RETURN
1320 REM *** read keys ***
1330 REM
1340 WHILE INKEY$<>"":WEND
1350 a$=INKEY$
1360 IF t<194 THEN RETURN
1370 IF a$="" THEN GOSUB 1590:GOTO 1350
1380 a=ASC(a$)
1390 IF a=1 OR a=7 THEN RETURN
1400 IF a<240 OR a>243 THEN 1350
1410 IF a=242 THEN m=128
1420 IF a=243 THEN m=130
1430 RETURN
1440 REM
1450 REM *** movement ***
1460 REM
1470 LOCATE x,y:PRINT CHR$(32);
1480 x1=x:y1=y
1490 x=x+(a=242)-(a=243)
1500 y=y+(a=240)-(a=241)
1510 IF x<2 THEN x=2
1520 IF x>19 THEN x=19
1530 IF y<2 THEN y=2
1540 IF y>19 THEN y=19
1550 IF board(y,x)<>132 AND board(y,x)<>135 TH
     EN 1760
1560 x=x1:y=y1
1570 RETURN
1580 REM
1590 REM *** print man ***
1600 REM
1610 LOCATE x,y:PEN 4
1620 PRINT CHR$(m);
1630 IF gx=0 THEN 1660
1640 LOCATE gx,gy:PEN 1
1650 PRINT CHR$(n);
1660 c=c+1
1670 IF c>20 THEN GOSUB 1690
1680 RETURN
1690 IF m=128 THEN m=129:GOTO 1730
1700 IF m=129 THEN m=128:GOTO 1730
1710 IF m=130 THEN m=131:GOTO 1730
1720 IF m=131 THEN m=130:GOTO 1730
1730 IF n=136 THEN n=137:GOTO 1750
1740 IF n=137 THEN n=136
1750 c=0:RETURN
```



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```
1760 IF board(y,x)=32 AND board(y+1,x)=32 THEN
     2230
1770 IF board(y,x)=133 THEN GOSUB 1900
1780 IF board(y,x)=207 THEN score=score+5:PEN
     4:LOCATE 8,24:PRINT USING"#####";score
1790 board(y,x)=32
1800 IF gx=0 THEN RETURN
1810 PEN 2
1820 LOCATE gx,gy:PRINT CHR$(board(gy,gx));
1830 gx1=gx:gy1=gy
1840 gx=gx+(gx>x)-(gx<x)
1850 gy=gy+(gy>y)-(gy<y)
1860 IF x=gx AND y=gy THEN LOCATE x,y:PEN 9:PR
     INT CHR$(238);:rr=-1
1870 IF board(gy,gx)<>207 AND board(gy,gx)<>32
      THEN gx=gx1:gy=gy1:RETURN
1880 RETURN
1890 REM
1900 REM *** update score ***
1910 REM
1920 score=score+50:PEN 4
1930 LOCATE 8,24:PRINT USING"#####";score
1940 LOCATE x,y:PEN 1:PRINT CHR$(134);
1950 FOR a=30 TO 50:SOUND 1,a,2:NEXT a
1960 count=count+1:'IF count>=max1 THEN 1650
1970 RETURN
1980 REM
1990 REM *** update time ***
2000 REM
2010 PLOT t,50:DRAW t,60,0
2020 t=t-4
2030 SOUND 3,t,2
2040 RETURN
2050 REM
2060 REM *** finish board ***
2070 REM
2080 board=board+1:ff=0
2090 men=men+1:IF men>99 THEN men=99
2100 PEN 4
2110 a=REMAIN(1)
2120 FOR a=t TO 194 STEP -4
2130 score=score+10
2140 LOCATE 8,24:PRINT USING"#####";score;
2150 PLOT a,50:DRAW a,60,0
2160 SOUND 3,a,2
2170 NEXT a
2180 IF board>10 THEN 6870
2190 GOSUB 3370
2200 GOSUB 800
2210 LOCATE 18,24:PEN 4:PRINT USING"##";men
2220 GOTO 180
2230 REM
2240 REM *** fall ***
2250 REM
2260 y=y+1
2270 IF y>19 THEN y=19
2280 GOSUB 1590
2290 LOCATE x,y:PRINT CHR$(32);:SOUND 2,y*2,5
2300 IF board(y+1,x)<>32 THEN RETURN
2310 GOTO 2260
2320 REM
2330 REM *** check rocks ***
2340 REM
2350 IF board(y-1,x)=132 THEN rr=1:RETURN ELSE
      rr=0
2360 LOCATE x,y:PEN 4:PRINT CHR$(m);
2370 IF gx<>0 THEN LOCATE gx,gy:PEN 1:PRINT CH
     R$(n);
2380 IF x1=x AND y1=y THEN RETURN
2390 IF board(y1-1,x1-1)=132 AND board(y1-1,x1
     )=32 THEN 2430
2400 IF board(y1-1,x1+1)=132 AND board(y1-1,x1
     )=32 THEN 2540
2410 RETURN
2420 REM
2430 REM *** fall from left ***
2440 REM
2450 x2=x1-1:y2=y1-1
2460 LOCATE x1-1,y1-1:PRINT CHR$(32);
2470 board(y1-1,x1-1)=32
2480 SOUND 1,500,20
2490 LOCATE x1,y1:PEN 3:PRINT CHR$(132);
2500 board(y1,x1)=132
2510 SOUND 2,400,5
2520 GOTO 2660
2530 REM
2540 REM *** fall from right ***
2550 REM
2560 x2=x1+1:y2=y1-1
2570 LOCATE x1+1,y1-1:PRINT CHR$(32);
2580 board(y1-1,x1+1)=32
2590 SOUND 1,500,20
2600 LOCATE x1,y1:PEN 3:PRINT CHR$(132);
2610 board(y1,x1)=132
2620 SOUND 2,400,5
2630 REM
2640 REM *** rock fall ***
2650 REM
2660 IF board(y2-1,x2)=132 THEN GOSUB 6370
2670 IF x1=x AND (y1+1=y OR y1=y) THEN 2840
2680 IF board(y1+1,x1)<>32 THEN GOSUB 2780:RET
     URN
2690 LOCATE x1,y1:PRINT CHR$(32);
2700 board(y1,x1)=32
2710 y1=y1+1
2720 SOUND 2,y1*2,3
2730 IF x=x1 AND y=y1 THEN 2840
2740 LOCATE x1,y1:PEN 3:PRINT CHR$(132);
2750 board(y1,x1)=132
2760 GOTO 2680
2770 REM
2780 REM *** fall again? ***
2790 REM
2800 IF board(y1+1,x1+1)=32 AND board(y1,x1+1)
     =32 THEN 6190
2810 IF board(y1+1,x1-1)=32 AND board(y1,x1-1)
     =32 THEN 6280
2820 RETURN
2830 REM
2840 REM *** squash! ***
2850 REM
2860 LOCATE x,y-1:PRINT CHR$(32);
2870 SOUND 1,500,20
2880 LOCATE x,y:PEN 9:PRINT CHR$(132);
2890 SOUND 2,400,5
2900 men=men-1
2910 LOCATE 18,24:PEN 4:PRINT USING"##";men
2920 REM
2930 REM *** end routine ***
2940 REM
2950 FOR a=100 TO 200:SOUND 1,a,2:NEXT a
2960 LOCATE 18,24:PEN 4:PRINT USING"##";men;
2970 IF men <1 THEN 3050
2980 a=REMAIN (1)
2990 PEN 2
3000 GOSUB 3380
```

LISTING

```
3010 PEN 4:LOCATE 7,22:PRINT STRING$(12,143);
3020 GOSUB 800
3030 GOTO 180
3040 REM
3050 REM *** game over ***
3060 REM
3070 LOCATE 6,10:PRINT CHR$(22)+CHR$(1);:PEN 4
     :PRINT"GAME  OVER";:PRINT CHR$(22)+CHR$(0
     );
3080 a=REMAIN(1)
3090 IF score>hiscore THEN hiscore=score:GOSUB
      5890 ELSE FOR a=1 TO 2000:NEXT a
3100 LOCATE 7,22:PEN 4:PRINT STRING$(12,143);
3110 GOSUB 790
3120 GOTO 170
3130 REM
3140 REM *** title screen ***
3150 REM
3160 CLS#1
3170 PEN#1, 2:LOCATE#1, 3,4:PRINT#1,"Guide  FR
     EDDIE";
3180 LOCATE#1,1,5:PRINT#1,"around  the screen"
     ;
3190 LOCATE#1,1,6:PRINT#1,"with the  <ARROWS>"
     ;
3200 LOCATE#1,1,8:PEN#1,7:PRINT#1,"Collect  Tr
     easures";
3210 LOCATE#1,4,10:PEN#1,3:PRINT#1,"Avoid  Roc
     ks";
3220 LOCATE#1,5,13:PEN#1,4:PRINT#1,"HIGH SCORE
     ";
3230 LOCATE#1,5,15:PAPER#1,4:PEN#1,5:PRINT#1,U
     SING"#####";hiscore:LOCATE#1,10,15:PRINT#
     1,"  ";name$;:PAPER#1,0
3240 LOCATE#1,4,18:PEN#1,1:PRINT#1,"PRESS A KE
     Y";
3250 PEN 2
3260 xx=0:demo=0:board=1:ff=0
3270 WHILE INKEY$<>"":WEND
3280 a$=INKEY$:xx=xx+1
3290 IF xx>2000 THEN GOTO 6530
3300 IF a$="" THEN 3280
3310 LOCATE 1,24:PEN 5:GOSUB 700
3320 IF a$=CHR$(12) THEN GOTO 5680
3330 IF a$=CHR$(2) THEN GOSUB 6050
3340 IF a$=CHR$(8) THEN GOTO 6730
3350 IF a$=CHR$(4) THEN 6530
3360 IF a$=CHR$(14)THEN CALL 0
3370 FOR a=200 TO 100 STEP -5:SOUND 1,a,5:SOUN
     D 2,a*2,5:SOUND 3,a*3,5:NEXT a
3380 CLS#1
3390 LOCATE 7,10:PEN 4:PRINT"Board";board;
3400 RETURN
3410 REM
3420 REM *** BOARD 1 ***
3430 REM
3440 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
3450 DATA 1,1,1,1,4,4,4,1,1,1,1,1,1,1,1,1,1,1
3460 DATA 1,1,2,1,1,1,1,1,1,1,0,0,0,0,0,0,2,1
3470 DATA 1,1,1,3,2,1,1,2,1,1,0,1,1,1,1,1,1,1
3480 DATA 1,1,1,1,1,1,1,2,1,1,0,1,1,1,1,1,1,1
3490 DATA 2,1,1,1,1,1,1,3,1,1,0,1,1,1,1,1,1,1
3500 DATA 3,1,1,1,1,1,1,1,1,1,0,1,1,2,2,1,1,1
3510 DATA 1,1,1,2,3,2,1,1,1,0,3,1,1,3,3,3,1,1
3520 DATA 1,1,1,1,1,1,1,1,1,0,1,1,1,1,2,2,1,1
3530 DATA 1,1,1,1,1,1,1,1,1,0,1,1,1,1,1,1,1,1
3540 DATA 1,1,2,1,1,1,2,1,1,0,1,1,1,1,1,1,1,1
3550 DATA 1,1,0,0,0,0,0,1,1,0,1,1,1,1,1,1,1,1
3560 DATA 1,1,0,4,4,4,0,1,1,0,1,1,1,1,1,1,1,1
3570 DATA 1,1,0,4,3,4,0,0,0,0,1,1,4,4,2,2,1,1
3580 DATA 1,1,0,4,3,4,0,1,1,1,1,1,2,2,2,2,1,1
3590 DATA 1,1,0,4,1,4,0,1,1,1,1,1,2,4,4,2,1,1
3600 DATA 1,1,0,0,0,0,0,1,1,1,1,1,1,1,1,1,1,1
3610 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,3,3,1,1
3620 DATA 12,0,0
3630 REM
3640 REM *** board 2 ***
3650 REM
3660 DATA 1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1
3670 DATA 1,1,2,1,1,1,0,0,2,2,0,0,1,1,1,2,1,1
3680 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
3690 DATA 1,1,1,1,1,1,1,1,3,3,1,1,1,1,1,1,1,1
3700 DATA 2,2,4,1,4,1,4,4,2,2,4,4,1,4,1,4,2,2
3710 DATA 1,1,1,1,0,0,0,1,1,1,1,0,0,0,1,1,1,1
3720 DATA 1,0,0,1,0,3,0,2,1,1,2,0,3,0,1,0,0,1
3730 DATA 1,0,0,1,0,2,2,1,1,1,1,2,2,0,1,0,0,1
3740 DATA 1,0,0,1,1,1,1,1,1,1,1,1,1,1,1,0,0,1
3750 DATA 1,0,0,0,1,1,1,1,1,1,1,1,1,1,0,0,0,1
3760 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3770 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3780 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3790 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3800 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3810 DATA 1,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,0,1
3820 DATA 1,0,0,0,0,0,1,0,2,2,0,1,0,0,0,0,0,1
3830 DATA 3,3,3,3,3,3,1,3,4,4,3,1,3,3,3,3,3,3
3840 DATA 18,0,0
3850 REM
3860 REM *** board 3 ***
3870 REM
3880 DATA 1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,1,1,1
3890 DATA 1,1,1,0,0,0,0,0,2,2,0,0,0,0,0,1,1,1
3900 DATA 1,1,1,2,2,0,0,0,1,1,0,0,0,2,2,1,1,1
3910 DATA 1,1,2,3,1,0,0,0,1,1,0,0,0,1,3,2,1,1
3920 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
3930 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
3940 DATA 4,4,4,4,4,4,4,2,0,0,2,4,4,4,4,4,4,4
3950 DATA 4,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,2
3960 DATA 4,0,0,0,0,0,0,0,3,3,0,0,1,1,1,1,3,2
3970 DATA 4,0,0,0,0,0,0,0,1,1,0,0,0,0,0,0,1,2
3980 DATA 4,0,0,0,0,0,1,1,1,1,1,1,0,0,0,0,1,2
3990 DATA 4,0,2,2,1,1,1,1,1,1,1,1,1,1,0,0,1,2
4000 DATA 4,0,0,2,1,1,2,2,1,1,2,2,1,1,0,0,1,2
4010 DATA 4,0,0,2,1,3,3,3,1,1,3,3,3,1,0,0,1,2
4020 DATA 4,0,0,2,1,1,1,1,1,1,1,1,1,1,0,0,1,2
4030 DATA 4,0,0,2,1,1,1,1,1,1,1,1,1,1,0,0,1,2
4040 DATA 4,3,3,2,1,1,1,1,1,1,1,1,1,1,1,1,1,2
4050 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4
4060 DATA 13,0,0
4070 REM
4080 REM *** board 4 ***
4090 REM
4100 DATA 1,1,2,0,0,0,0,0,0,0,0,0,0,0,0,2,1,1
4110 DATA 1,1,2,0,0,0,0,3,3,3,3,0,0,0,0,2,1,1
4120 DATA 1,1,1,1,1,2,4,1,4,4,1,4,2,1,1,1,1,1
4130 DATA 1,1,2,2,1,0,0,3,3,3,3,0,0,1,2,2,1,1
4140 DATA 1,1,3,2,0,0,0,0,0,0,0,0,0,0,2,3,1,1
4150 DATA 1,1,1,1,0,2,2,2,2,2,2,2,2,0,1,1,1,1
4160 DATA 1,4,1,1,0,2,2,2,2,2,2,2,2,0,1,1,4,1
4170 DATA 1,4,1,1,0,0,0,0,0,0,0,0,0,0,1,1,4,1
4180 DATA 1,1,1,1,4,4,4,4,4,4,4,4,4,4,1,1,1,1
4190 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
4200 DATA 1,0,2,2,1,1,2,2,2,2,2,2,1,1,2,2,0,1
4210 DATA 1,0,0,0,1,1,0,0,0,0,0,0,1,1,0,0,0,1
```

```
4220 DATA 1,1,1,1,1,0,0,0,0,0,0,0,1,1,1,1,1
4230 DATA 1,0,0,0,1,0,3,3,3,3,3,3,0,1,0,0,0,1
4240 DATA 1,0,0,0,1,0,0,0,0,0,0,0,1,0,0,0,1
4250 DATA 1,0,0,0,1,0,2,2,2,2,2,2,0,1,0,0,0,1
4260 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4
4270 DATA 4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4,4
4280 DATA 16,0,0
4290 REM
4300 REM *** board 5 ***
4310 REM
4320 DATA 1,1,1,2,2,1,0,0,0,0,0,1,1,1,1,1,1,2
4330 DATA 1,1,1,3,3,1,0,0,0,0,1,1,0,0,0,0,0,0
4340 DATA 1,1,4,4,4,1,4,4,4,4,1,0,0,0,3,3,3,0
4350 DATA 1,4,3,3,4,1,4,2,2,0,1,0,0,0,0,0,0,0
4360 DATA 1,4,1,0,4,1,4,2,0,0,1,4,4,4,0,0,0,0
4370 DATA 1,4,1,0,4,1,4,0,0,1,1,0,0,0,0,0,0,0
4380 DATA 1,4,1,4,4,1,0,0,1,1,2,2,4,4,0,0,0,0
4390 DATA 1,0,1,1,1,1,0,0,1,0,0,0,0,0,0,0,0,0
4400 DATA 1,1,1,1,1,1,3,3,3,0,0,0,0,0,0,0,0,0
4410 DATA 2,2,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,2
4420 DATA 0,0,0,1,0,0,0,0,4,4,0,0,0,0,0,0,4
4430 DATA 0,0,0,1,0,2,2,2,0,0,0,0,0,0,0,1,1,4
4440 DATA 1,1,1,2,0,1,1,0,0,0,0,2,0,0,0,4,1,4
4450 DATA 4,0,0,4,0,2,2,0,4,0,0,4,0,0,0,4,1,4
4460 DATA 4,0,0,4,0,0,0,0,4,0,0,1,1,1,1,1,1,4
4470 DATA 4,0,0,4,0,0,0,0,4,0,0,4,0,2,4,0,3,4
4480 DATA 4,3,3,1,1,1,1,1,1,3,3,4,0,2,4,4,4,4
4490 DATA 4,4,4,4,0,2,2,0,4,4,4,4,0,2,0,0,2,0
4500 DATA 15,0,0
4510 REM
4520 REM *** board 6 ***
4530 REM
4540 DATA 1,0,4,1,3,1,1,1,1,1,1,1,1,1,1,3,4,3
4550 DATA 4,0,4,1,4,1,4,4,4,4,4,4,4,4,4,4,4,1
4560 DATA 4,0,4,1,4,1,4,1,3,1,4,1,3,2,2,2,2,1
4570 DATA 4,0,4,1,4,1,1,1,4,1,4,1,4,2,2,2,2,1
4580 DATA 4,0,4,1,4,4,4,4,4,1,4,1,4,2,2,2,2,1
4590 DATA 4,0,4,1,4,4,1,1,1,1,4,1,4,2,2,2,2,1
4600 DATA 4,0,4,1,4,4,1,4,4,4,4,1,4,4,4,4,2,1
4610 DATA 4,0,4,1,4,4,1,4,1,1,1,1,1,1,3,4,2,1
4620 DATA 4,0,4,1,4,4,1,1,3,4,4,4,4,4,1,1,2,1
4630 DATA 4,0,4,1,4,1,1,4,4,4,4,4,4,4,4,1,2,1
4640 DATA 4,0,4,1,4,1,4,4,1,1,1,1,1,3,4,1,2,1
4650 DATA 4,0,4,1,4,1,4,1,1,4,4,4,4,1,4,1,2,1
4660 DATA 4,0,4,1,4,1,4,1,4,4,4,4,4,1,4,1,2,1
4670 DATA 4,0,4,1,4,1,4,1,4,1,3,1,4,1,4,1,2,1
4680 DATA 4,0,4,1,4,1,4,1,4,1,4,1,4,1,4,1,2,1
4690 DATA 4,0,4,1,4,1,4,1,4,1,4,1,4,1,4,1,2,1
4700 DATA 4,0,4,1,4,1,4,1,4,1,4,1,4,4,4,1,4,1
4710 DATA 4,0,3,0,4,1,1,1,1,1,4,1,1,1,1,1,4,1
4720 DATA 10,0,0
4730 REM
4740 REM *** board 7 ***
4750 REM
4760 DATA 1,1,1,1,1,1,1,1,1,2,1,1,3,1,4,4,2,2
4770 DATA 4,4,4,2,1,4,1,2,1,2,1,2,3,1,1,1,1,1
4780 DATA 3,3,3,1,1,1,1,4,1,2,1,2,4,1,2,1,1,1
4790 DATA 4,4,4,2,1,1,1,1,1,2,1,2,4,1,2,1,1,4
4800 DATA 1,1,1,1,1,1,1,1,1,2,1,2,4,1,3,1,1,1
4810 DATA 1,4,1,1,1,1,1,1,1,2,1,2,4,1,3,1,1,1
4820 DATA 2,4,1,2,4,1,4,4,4,2,1,2,4,1,3,1,1,1
4830 DATA 1,1,1,1,0,1,1,1,4,4,1,4,4,2,2,4,0,4
4840 DATA 4,4,4,4,0,4,4,1,1,1,1,3,3,2,4,0,0,0
4850 DATA 2,2,2,2,0,2,4,4,4,4,4,2,4,2,4,0,0,0
4860 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
4870 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
4880 DATA 4,4,4,4,0,4,4,4,1,4,4,4,4,4,1,4,4,4
4890 DATA 0,0,0,0,0,1,1,1,1,1,1,4,1,1,1,1,1,3
4900 DATA 0,0,0,0,0,1,1,1,4,4,1,4,1,4,1,4,1,2
4910 DATA 1,1,1,2,3,2,1,1,4,4,1,4,1,4,1,4,1,2
4920 DATA 0,0,0,2,1,3,2,1,1,4,1,4,1,4,1,4,1,2
4930 DATA 0,0,0,2,1,1,4,1,1,4,1,1,1,4,1,1,1,4
4940 DATA 13,0,0
4950 REM
4960 REM *** board 8 ***
4970 REM
4980 DATA 0,1,2,3,0,4,3,4,0,0,0,0,0,1,1,1,1,3
4990 DATA 1,1,1,4,0,4,3,4,0,0,0,0,0,0,0,0,0,1
5000 DATA 2,2,1,4,0,0,1,0,0,0,0,0,0,0,0,0,0,1
5010 DATA 1,1,1,4,2,4,0,4,0,0,3,0,0,0,0,0,2,1
5020 DATA 0,0,0,0,1,2,0,2,0,4,4,4,4,0,0,0,2,1
5030 DATA 0,0,0,0,1,2,0,4,0,0,0,0,0,0,0,0,2,1
5040 DATA 0,0,0,0,1,1,0,0,0,0,0,0,0,0,0,0,4,1
5050 DATA 0,0,0,0,1,4,1,1,1,4,1,1,1,1,1,1,4,1
5060 DATA 0,0,0,0,1,4,1,1,2,4,4,4,4,2,1,1,4,1
5070 DATA 0,0,0,1,1,1,1,1,3,3,3,3,3,3,1,1,4,1
5080 DATA 0,0,0,1,0,4,1,1,2,2,2,2,2,2,1,1,4,1
5090 DATA 2,0,0,1,0,4,1,1,1,1,1,1,1,1,1,1,1,1
5100 DATA 1,0,0,1,0,4,1,1,4,4,4,4,4,4,0,4,4,0
5110 DATA 3,0,0,1,0,4,4,4,4,0,0,0,0,0,0,0,0,0
5120 DATA 1,0,0,1,0,0,0,0,0,0,0,0,0,0,4,0,0,0
5130 DATA 3,0,0,1,0,0,0,0,0,0,0,0,0,0,0,4,0,0
5140 DATA 1,0,0,1,1,1,1,1,1,1,1,1,1,1,0,0,4,0
5150 DATA 3,3,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,4
5160 DATA 15,0,0
5170 REM
5180 REM *** board 9 ***
5190 REM
5200 DATA 0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
5210 DATA 1,1,2,1,1,1,1,1,1,2,1,1,1,1,1,1,1,2
5220 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
5230 DATA 1,1,1,1,2,1,1,2,1,1,1,1,2,1,1,1,1,1
5240 DATA 2,1,1,1,1,1,1,1,1,1,1,1,1,1,1,2,1,1
5250 DATA 1,1,2,1,1,1,4,4,4,4,4,1,1,1,1,1,1,1
5260 DATA 1,1,1,1,1,1,4,1,1,1,4,1,1,1,1,1,1,1
5270 DATA 1,1,1,1,1,1,4,1,1,1,4,1,1,2,1,1,1,1
5280 DATA 1,2,1,1,1,1,2,4,4,1,4,1,1,1,1,1,1,1
5290 DATA 1,1,1,1,1,1,2,1,3,1,4,1,1,1,1,2,1,1
5300 DATA 1,1,1,1,1,1,2,1,3,1,4,1,1,1,1,1,1,1
5310 DATA 1,1,1,2,1,1,4,1,1,1,4,1,1,1,1,1,1,1
5320 DATA 1,1,1,1,1,1,4,4,4,4,4,1,1,2,1,1,1,1
5330 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
5340 DATA 1,1,2,4,2,4,2,4,2,4,2,4,2,1,1,1,1,1
5350 DATA 1,1,0,2,0,2,1,2,1,2,0,2,0,1,1,1,1,1
5360 DATA 1,1,3,1,3,1,4,1,4,1,3,1,3,1,1,1,1,1
5370 DATA 1,1,1,2,1,2,1,2,1,2,1,2,1,1,1,1,1,1
5380 DATA 6,11,12
5390 REM *** board 10 ***
5400 REM
5410 DATA 0,1,1,1,1,1,1,1,1,1,1,1,1,2,4,4,4,2
5420 DATA 1,1,1,1,1,4,4,4,4,1,1,1,1,4,3,3,3,2
5430 DATA 1,1,1,1,1,4,1,1,1,1,1,1,1,2,0,0,3,2
5440 DATA 1,1,1,1,1,4,1,1,4,1,1,1,1,4,3,3,3,2
5450 DATA 1,1,1,1,1,4,1,1,4,1,1,1,1,2,2,2,2,2
5460 DATA 2,2,1,1,1,4,4,4,4,1,1,1,1,1,1,1,1,1
5470 DATA 3,1,1,1,1,2,1,1,1,1,1,1,1,1,1,1,1,1
5480 DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
5490 DATA 1,1,1,1,1,1,1,1,1,1,2,1,2,1,1,1,1,1
5500 DATA 1,1,1,1,1,1,1,1,1,1,4,1,4,1,1,1,1,1
5510 DATA 1,1,1,1,1,1,1,1,1,1,4,1,4,1,1,1,1,1
5520 DATA 1,1,2,1,1,1,1,1,4,4,4,1,4,4,1,1,1,1
5530 DATA 4,1,4,1,1,1,4,4,4,0,0,0,0,4,4,1,1,1
5540 DATA 4,1,4,1,4,4,4,2,0,0,0,2,0,0,4,4,1,3
5550 DATA 4,1,4,4,4,0,0,1,0,0,2,0,2,0,0,4,4,1
5560 DATA 4,3,4,0,0,0,0,1,0,0,0,0,0,0,0,2,4,4
5570 DATA 4,1,0,0,0,0,0,1,0,2,0,1,0,2,0,1,0,4
```

SHINECREST

COMPUTER WORKSTATIONS AND DESKS

The latest addition to the Shinecrest range has been enthusiastically received by both dealers and home computer owners for providing all the facilities a computer user could require. Shown in our photograph with the Amstrad CPC464 you can see there remains plenty of space both behind and alongside the computer. The raised shelf provides ample room for your monitor, and if you choose, a printer. Any weight will be easily supported as all the shelves are fitted to two metal rails which travel the full width of the desk and locate into the metal ends. Castors provide an often needed mobility for your desk. The shelves are supplied in a Teak woodgrain finish to compliment the dark metalic brown painted metal rails and end frames.

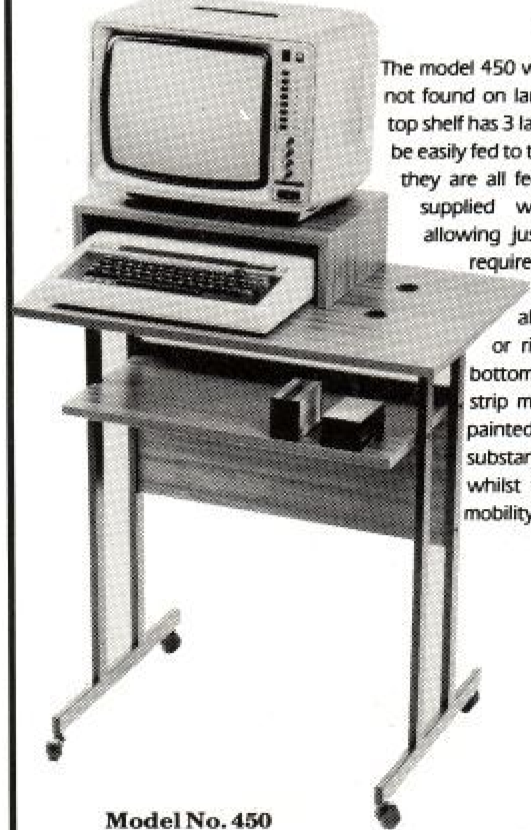
At the back of the desk there is ample space above and below the courtesy panel for interconnecting leads and paper feed to the printer. Every requirement has been provided for.



Model No. 600

Dimensions		
	Distance between top and middle shelf	146 mm (5¾")
	Distance between middle and bottom shelf	216 mm (8½")
	Depth of plinth	292 mm (11½")
	Depth of bottom shelf	320 mm (12½")
	Width	983 mm (36¾")
	Depth	610 mm (24")
	Height	889 mm (35")

PRICE £69-95



Model No. 450

The model 450 workstation has many features not found on large desks twice the cost. The top shelf has 3 large holes to allow the leads to be easily fed to the back of the unit. Once here they are all fed into a 4 into 1 masterplug supplied with the workstation, thus allowing just one lead (supplied) to be required for mains electricity. The pre formed plinth is moveable allowing it to be used either left or right "handed". Fitted to the bottom edges is a non slip rubber strip making your monitor safe. The painted metal frame provides substantial strength and stability whilst the fitted castors allow easy mobility.

Dimensions		
	Depth of plinth	296 mm (11½")
	Width of plinth	478 mm (18¾")
	Distance between lower shelf and working shelf	178 mm (7")
	Width	762 mm (30")
	Depth	500 mm (19¾")
	Height	743 mm (29¼")

PRICE £59-95



Model No. 500

An attractive piece of computer furniture the model 500 also provides all the computers users requirements. A full width monitor shelf allows easy left or right handed operation whilst still providing space for the printer. The large work surface gives plenty of room for your Amstrad computer with ample "working room" still available. A unique Shinecrest development allows the desk to be mobile by the fixing of 2 painted metal castor supports. The very large courtesy panel ensures that the desk is stable and solid and will not "rock" like some models available. The back is "cut away" to allow unobtrusive removal of leads. The model 500 is available in a Teak woodgrain finish.

Dimensions		
	Depth of plinth	296 mm (11½")
	Distance between top and middle shelf	130 mm (5")
	Width	965 mm (38")
	Depth	590 mm (23¼")
	Height	865 mm (34")

PRICE £54-95

Shinecrest Products Ltd. are a well established company supplying many major Electronic companys including Amstrad. Our range of products are sold by such outlets as Harrods, Selfridges and D.H. Evans.

To obtain your computer desk or work station we suggest you purchase at any of the following dealers:-

Spectrum Dealers, 3D Computers, Ramco, Sewards, P.H. Electronics, Colchester Co-ops, Oxford & Swindon Co-ops, Trionic, and from most AMSTRAD Stockists.

In the unlikely event that you are unable to obtain the product you require, please contact Shinecrest at the address below, who will provide the name and address of your nearest stockist.

SHINECREST PRODUCTS LTD.,
UNIT 14, DICKER MILL,
HERTFORD, HERTS
TEL. HERTFORD (0992) 51977

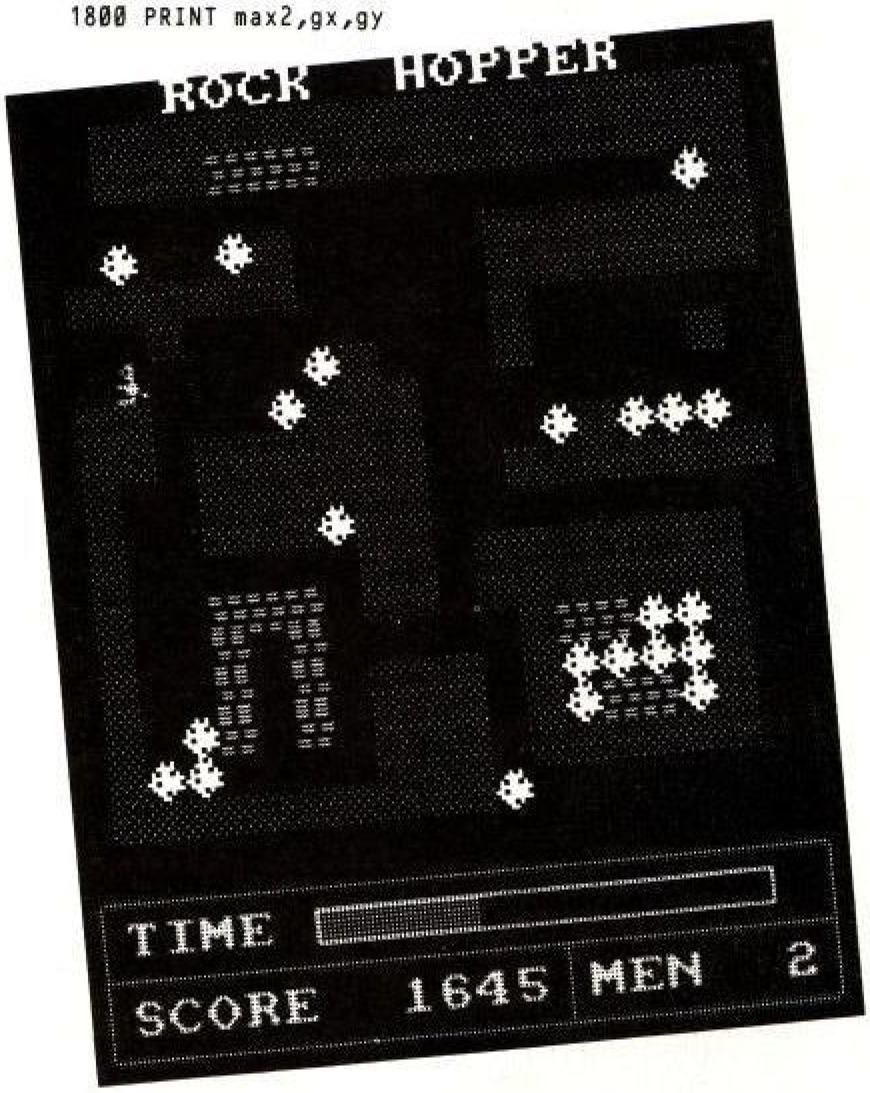
```
5580 DATA 4,1,0,0,0,0,0,1,0,0,3,3,3,0,0,1,0,4
5590 DATA 13,17,4
5600 REM
5610 REM *** break routine ***
5620 REM
5630 MODE 1:PEN 1:PRINT"returning to basic":GO
     TO 5650
5640 MODE 1:PEN 1:PRINT"Error";ERR;"in line";E
     RL
5650 SPEED KEY 40,2
5660 END
5670 REM
5680 REM *** load in board ***
5690 REM
5700 CLS#1
5710 PEN 4:WINDOW SWAP 0,1
5720 LOCATE 2,3:PRINT"Load in Board.";
5730 LOCATE 2,5:PRINT"Press PLAY then";
5740 LOCATE 2,6:PRINT"press SPACE.";
5750 LOCATE 2,9:PRINT"ENTER to abort.";
5760 a$=INKEY$
5770 IF a$="" THEN 5760
5780 IF a$=CHR$(13) THEN WINDOW SWAP 0,1:GOTO
     3160
5790 IF a$<>" " THEN 5760
5800 LOCATE 2,10:PRINT"Searching...";
5810 OPENIN"!board"
5820 LOCATE 2,12:PRINT"Loading....";
5830 FOR a=2 TO 19
5840 FOR b=2 TO 19
5850 INPUT#9,loadboard(a,b)
5860 NEXT b,a
5870 INPUT#9,max2,lgx,lgy
5880 CLOSEIN:WINDOW SWAP 0,1:GOTO 3160
5890 REM
5900 REM *** hi score ***
5910 REM
5920 name$=""
5930 LOCATE 6,12:PRINT"HIGH SCORE";
5940 LOCATE 9,14:PRINT"???";
5950 FOR a=1 TO 3
5960 WHILE INKEY$<>"":WEND
5970 a$=INKEY$:IF a$="" THEN 5970
5980 LOCATE A+8,14:PRINT a$;:name$=name$+a$
5990 NEXT a
6000 FOR a=1 TO 5:SOUND 1,200,2:SOUND 1,0,2:NE
     XT a
6010 RETURN
6020 REM
6030 REM *** select board ***
6040 REM
6050 LOCATE#1,1,18:PEN#1,4:PRINT#1,"SELECT BOA
     RD    ??";
6060 b$=""
6070 FOR a=1 TO 2
6080 WHILE INKEY$<>"":WEND
6090 a$=INKEY$:IF a$="" THEN 6090
6100 IF a$<>CHR$(13) AND (a$<"0" OR a$>"9") TH
     EN 6090
6110 LOCATE#1,a+16,18:PRINT#1,a$;
6120 b$=b$+a$
6130 NEXT a
6140 LOCATE#1,1,18:PRINT#1,SPACE$(18);
6150 b=VAL(b$)
6160 IF b=99 THEN ff=-1:GOTO 6180
6170 IF b<1 OR b>10 THEN GOTO 6050
6180 board=b:RETURN
6190 REM
6200 REM *** fall to right ***
6210 REM
6220 LOCATE x1,y1:PRINT CHR$(32);:board(y1,x1)
     =32
6230 SOUND 1,200,20
6240 x1=x1+1:y1=y1+1
6250 LOCATE x1,y1:PEN 3:PRINT CHR$(132);:board
     (y1,x1)=132
6260 SOUND 2,100,5
6270 GOTO 2660
6280 REM
6290 REM *** fall to left ***
6300 REM
6310 LOCATE x1,y1:PRINT CHR$(32);:board(y1,x1)
     =32
6320 SOUND 1,200,20
6330 x1=x1-1:y1=y1+1
6340 LOCATE x1,y1:PEN 3:PRINT CHR$(132);:board
     (y1,x1)=132
6350 SOUND 2,100,5
6360 GOTO 2660
6370 REM
6380 REM *** another fall ***
6390 REM
6400 LOCATE x2,y2-1:PRINT CHR$(32);:board(y2-1
     ,x2)=32
6410 SOUND 1,200,20
6420 LOCATE x2,y2:PEN 3:PRINT CHR$(132);:board
     (y2,x2)=132
6430 SOUND 2,100,5
6440 IF board(y2+1,x2)<>32 THEN RETURN
6450 y2=y2+1
6460 LOCATE x2,y2-1:PRINT CHR$(32):board(y2-1,
     x2)=32
6470 SOUND 1,y2,2
6480 LOCATE x2,y2:PEN 3:PRINT CHR$(132);:board
     (y2,x2)=132
6490 GOTO 6440
6500 REM
6510 REM *** demo mode ***
6520 REM
6530 CLS#1:LOCATE#1,1,2:PEN#1,1:PRINT#1,"Hit a
      key to start";
6540 LOCATE#1,5,4:PEN#1,2:PRINT#1,"DEMO  MODE"

6550 PRINT#1:PRINT#1
6560 PRINT#1:PEN#1,6:PRINT#1,"FINISH - 10 x TI
     ME"
6570 PRINT#1:PEN#1,7:PRINT#1,"   ";CHR$(133);"
      - 50 POINTS"
6580 PRINT#1:PEN#1,2:PRINT#1,"   ";CHR$(207);"
      -  5 POINTS"
6590 PRINT#1:PEN#1,3:PRINT#1,"   ";CHR$(132);"
      -  ROCKS"
6600 PRINT#1:PEN#1,8:PRINT#1,"   ";CHR$(135);"
      -  WALLS";
6610 demo=1
6620 board=1
6630 FOR a=1 TO 2000:IF INKEY$<>"" THEN 3140 E
     LSE NEXT a
6640 CLS#1:LOCATE#1,5,9:PEN#1,4:PRINT#1,USING"
     Board ##";board
6650 GOSUB 860
6660 IF demo=2 THEN GOTO 3140
6670 board=board+1
6680 IF board>10 THEN FOR a=1 TO 3000:NEXT a:G
```

```
    OTO 6530
6690 GOTO 6630
6700 REM
6710 REM *** key functions ***
6720 REM
6730 CLS#1
6740 PEN#1,5:LOCATE#1,1,1:PRINT#1," KEY      FU
    NCTION ";
6750 PEN#1,4:LOCATE#1,1,3:PRINT#1,"ARROWS     M
    OVEMENT";
6760 PRINT#1,"  ↑A     ABORT MAN";
6770 PRINT#1,"  ↑G      END GAME"
6780 PRINT#1:PEN#1,3:PRINT#1,"  ↑B  SELECT BOA
    RD";
6790 PRINT#1,"  ↑H   THIS SCREEN";
6800 PRINT#1,"  ↑D     DEMO MODE";
6810 PRINT#1,"  ↑L    LOAD BOARD";
6820 PRINT#1,"  ↑N          RESET"
6830 PRINT#1:PEN#1,2:PRINT#1,"    (↑ = CTRL)"
6840 LOCATE#1,4,18:PEN#1,1:PRINT#1,"HIT ANY KE
    Y"
6850 WHILE INKEY$<>"":WEND
6860 A$=INKEY$:IF A$="" THEN 6860 ELSE GOTO 31
    60
6870 CLS#1:LOCATE#1,2,2:PEN#1,5:PRINT#1,"CONGR
    ATULATIONS!"
6880 PRINT#1:PEN#1,4:PRINT#1,"You have complet
    ed";
6890 PRINT#1,"all the  boards in";
6900 PRINT#1,"    this game."
6910 PRINT#1:PEN#1,1:PRINT#1," now you  can tr
    y"
6920 PRINT#1,"designing your own";
6930 PRINT#1," boards  with the"
6940 PRINT#1:PEN#1,2:PRINT#1,"  BOARD DESIGNER
    "
6950 PRINT#1:PRINT#1:PRINT#1:PEN#1,8:PRINT#1,"
     HIT A KEY TO END"
6960 WHILE INKEY$<>"":WEND
6970 a$=INKEY$:IF a$="" THEN 6970
6980 IF score>hiscore THEN hiscore=score:CLS#1
    :GOSUB 5920
6990 GOSUB 790:GOTO 170
```

```
10 REM ***************
20 REM Nick Stevens
70 REM ***************
80 ON BREAK GOSUB 1640
90 REM *** main loop ***
100 GOSUB 200:REM *** set up UDG's  ***
110 GOSUB 360:REM *** set up screen ***
120 GOSUB 500:REM ***      menu      ***
130 GOSUB 630:REM ***   variables    ***
140 GOSUB 720:REM *** print cursor   ***
150 GOSUB 780:REM ***    key press   ***
160 GOSUB 810:REM ***   decode key   ***
170 GOTO 140
180 GOTO 180
190 REM *** set up UDG's ***
200 DATA 24,56,24,8,124,28,11,120
210 DATA 24,56,24,8,124,29,122,0
220 DATA 24,28,24,16,62,56,208,30
230 DATA 24,28,24,16,62,184,94,0
240 DATA 20,60,90,127,222,127,52,24
250 DATA 0,0,62,73,127,73,127,0
260 DATA 0,0,0,0,0,0,0,0
270 DATA 238,238,0,119,119,0,238,238
280 DATA 108,146,214,124,56,24,28,14
290 SYMBOL AFTER 128
300 FOR B=128 TO 136
310 FOR A=1 TO 8:READ A(A):NEXT A
320 SYMBOL B,A(1),A(2),A(3),A(4),A(5),A(
    6),A(7),A(8)
330 NEXT B
340 RETURN
350 REM *** set up screen ***
360 MODE 0
370 INK 0,0:INK 1,26:INK 2,9:INK 3,13:IN
    K 4,24:INK 5,6:INK 6,2:INK 7,6,8
380 INK 8,10
390 SPEED INK 20,20
400 PAPER 0:PEN 6:CLS:BORDER 0
410 LOCATE 1,1
420 PRINT CHR$(150);STRING$(18,154);CHR$
    (156);
430 FOR a=2 TO 19
440 LOCATE 1,a:PRINT CHR$(149);
450 LOCATE 20,a:PRINT CHR$(149);
460 NEXT a
470 PRINT CHR$(147);STRING$(18,154);CHR$
    (153);
480 RETURN
490 REM *** print out menu ***
500 LOCATE 1,21: PEN 1
510 PRINT"PRESS      'S' - Save";
520 PRINT"           'L' - Load";
530 PRINT"      'arrows' - move";
540 PRINT"       'space' -reset";
550 PEN 5:PRINT"1=  2=  3=  4=  5="
560 LOCATE 3,25:PEN 3:PRINT CHR$(132);
570 LOCATE 7,25:PEN 2:PRINT CHR$(207);
580 LOCATE 11,25:PEN 7:PRINT CHR$(133);
590 LOCATE 15,25:PEN 8:PRINT CHR$(135);
600 LOCATE 19,25:PEN 1:PRINT CHR$(136);
610 RETURN
620 REM *** set up variables ***
630 DIM board(18,18)
640 x=2:y=2:gx=0:gy=0
650 c=159:ff=0
660 FOR a=1 TO 18
670 FOR b=1 TO 18
680 board(a,b)=32
690 NEXT b,a
700 RETURN
710 REM *** print cursor ***
720 PRINT CHR$(22)+CHR$(1);
730 LOCATE x,y
740 PEN 4:PRINT CHR$(c);
750 PRINT CHR$(22)+CHR$(0);
760 RETURN
770 REM *** wait for key press ***
780 a$=INKEY$:IF a$="" THEN 780
790 RETURN
800 REM *** decode key press ***
810 LOCATE x,y
820 IF a$="1" THEN PEN 3:PRINT CHR$(132)
    ;:board(y-1,x-1)=132:RETURN
830 IF a$="2" THEN PEN 2:PRINT CHR$(207)
    ;:board(y-1,x-1)=207:RETURN
840 IF a$="3" THEN PEN 7:PRINT CHR$(133)
    ;:board(y-1,x-1)=133:RETURN
850 IF a$="4" THEN PEN 8:PRINT CHR$(135)
    ;:board(y-1,x-1)=135:RETURN
860 IF a$=" " THEN PEN 0:PRINT CHR$(32);
    :board(y-1,x-1)=32:IF x=gx AND y=gy
```

```
    THEN gx=0:gy=0
870 IF a$=" " THEN RETURN
880 IF a$="5" THEN PEN 1:PRINT CHR$(136)
    ;:gx=x:gy=y:ff=-1:RETURN
890 IF a$="l" THEN GOSUB 1320:RETURN
900 IF a$="s" THEN GOSUB 1070:RETURN
910 IF a$="p" THEN GOTO 1680
920 a=ASC(a$)
930 IF board(y-1,x-1)=133 THEN PEN 7
940 IF board(y-1,x-1)=132 THEN PEN 3
950 IF board(y-1,x-1)=207 THEN PEN 2
960 IF board(y-1,x-1)=135 THEN PEN 8
970 IF gx=x AND gy=y THEN PEN 1:PRINT CH
    R$(136);:GOTO 990
980 PRINT CHR$(board(y-1,x-1));
990 x=x+(a=242)-(a=243)
1000 y=y+(a=240)-(a=241)
1010 IF x<2 THEN x=2
1020 IF x>19 THEN x=19
1030 IF y<2 THEN y=2
1040 IF y>19 THEN y=19
1050 RETURN
1060 REM *** save board ***
1070 LOCATE 1,21
1080 PRINT SPACE$(100);
1090 LOCATE 1,21
1100 PRINT"Ready cassette."
1110 PRINT"Press PLAY and REC"
1120 PRINT"then press SPACE"
1130 PRINT"ENTER to abort"
1140 GOSUB 780
1150 IF a$=CHR$(13) THEN GOSUB 500:RETUR
     N
1160 IF a$<>" " THEN 1140
1170 PRINT"Saving..."
1180 max2=0
1190 FOR a=1 TO 18:FOR b=1 TO 18
1200 IF board(a,b)=133 THEN max2=max2+1
1210 NEXT b,a
1220 OPENOUT "!board"
1230 FOR a=1 TO 18
1240 FOR b=1 TO 18
1250 PRINT#9,board(a,b)
1260 NEXT b,a
1270 PRINT#9,max2,gx,gy
1280 CLOSEOUT
1290 GOSUB 500
1300 RETURN
1310 REM *** load board ***
1320 LOCATE 1,21
1330 PRINT SPACE$(100);
1340 LOCATE 1,21
1350 PRINT"Ready cassette."
1360 PRINT"Press PLAY"
1370 PRINT"then press SPACE."
1380 PRINT"ENTER to abort."
1390 GOSUB 780
1400 IF a$=CHR$(13) THEN GOSUB 500:RETUR
     N
1410 IF a$<>" " THEN 1390
1420 PRINT"Loading..."
1430 OPENIN "!board"
1440 FOR a=1 TO 18
1450 FOR b=1 TO 18
1460 INPUT#9,board(a,b)
1470 NEXT b,a
1480 INPUT#9,max2,gx,gy
1490 CLOSEOUT
1500 FOR a=1 TO 18
1510 FOR b=1 TO 18
1520 LOCATE a+1,b+1
1530 IF board(b,a)=32 THEN PEN 0
1540 IF board(b,a)=132 THEN PEN 3
1550 IF board(b,a)=207 THEN PEN 2
1560 IF board(b,a)=133 THEN PEN 7
1570 IF board(b,a)=135 THEN PEN 8
1580 PRINT CHR$(board(b,a));
1590 NEXT b,a
1600 LOCATE gx,gy:PEN 1:PRINT CHR$(136);
1610 GOSUB 500
1620 RETURN
1630 REM *** error trap ***
1640 MODE 1
1650 PEN 1:PAPER 0:CLS
1660 PRINT"RETURNING TO BASIC"
1670 END
1680 MODE 2:PEN 1:PAPER 0:PRINT"DATA ";
1690 max2=0
1700 FOR a=1 TO 18
1710 FOR b=1 TO 18
1720 IF board(a,b)=32 THEN PRINT"0,";
1730 IF board(a,b)=207 THEN PRINT"1,";
1740 IF board(a,b)=132 THEN PRINT"2,";
1750 IF board(a,b)=133 THEN PRINT"3,";:m
     ax2=max2+1
1760 IF board(a,b)=135 THEN PRINT"4,";
1770 NEXT b
1780 PRINT:PRINT"DATA ";
1790 NEXT a
1800 PRINT max2,gx,gy
```

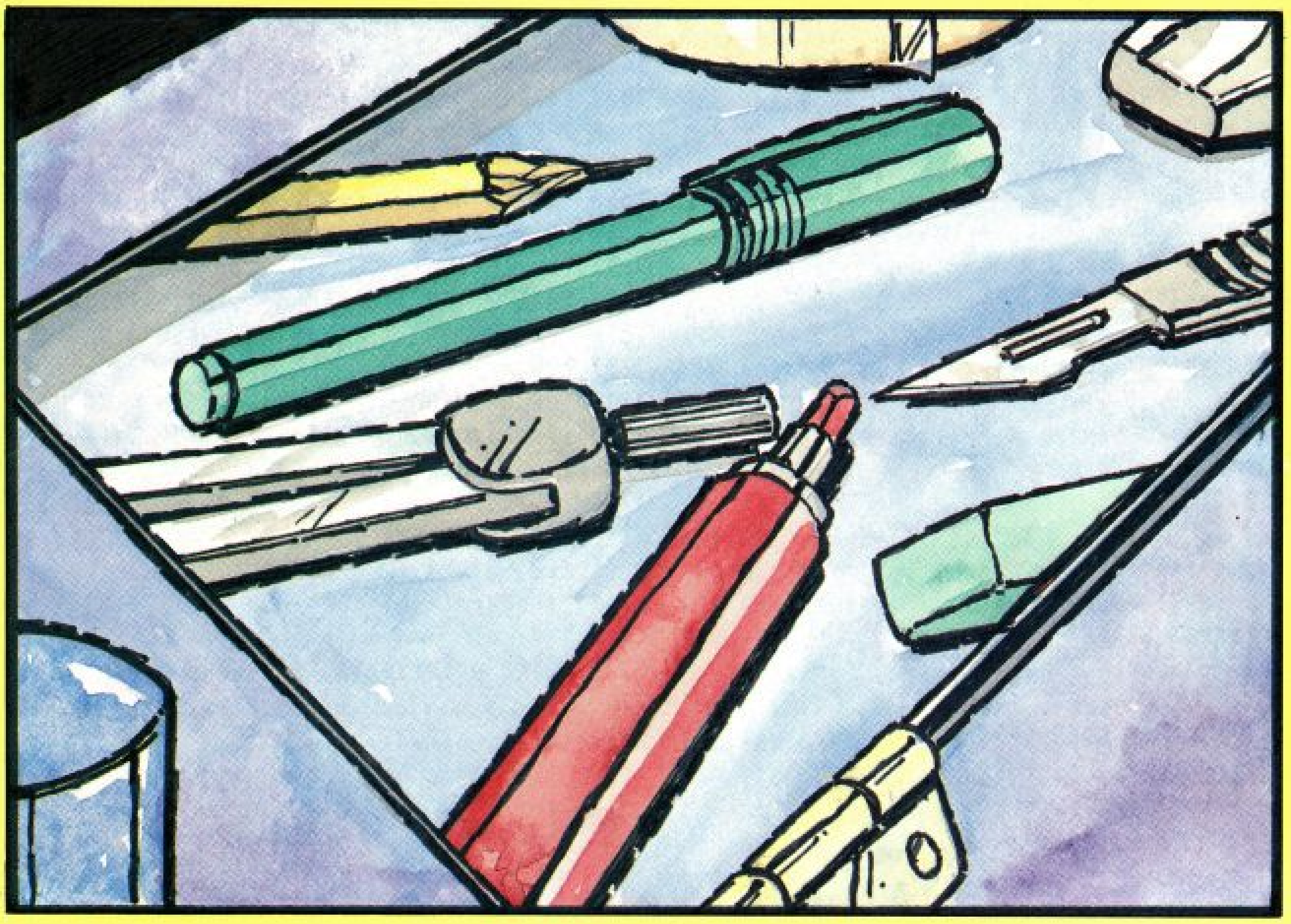


This program is available on tape -see page 13

GRAPHICS TOOLBOX

David Robinson.

PART 2



Before we discuss this months additions to the GRAPHICS TOOLBOX I would like to comment briefly on the two screen dump routines in the TOOLBOX in response to queries raised by several readers. First of all the easy answers :-

1. You can't do bit-image screen dumps to pen type plotters like the MCP. These devices work on an entirely different principle and need special separate software to drive them.
2. You can't do bit-image screen dumps to daisy wheel printers. The lowest resolution of these printers is one character which on a dot matrix printer is made up of at least 56 individual dots. It is this characteristic which allows us to manipulate each needle in the print head to produce detailed images on the paper.
3. You can't send a full mode 2 screen width to the Amstrad DMP1 printer. This is because a mode 2 screen is 620 dots wide and the DMP1 is only 480 dots wide. Similarly several 'Epson compatible' printers can only receive bit image information in 480 byte chunks which limits the maximum screen width in a similar way. Check your printer manual carefully to see what the limits are.

Two common queries are -

a. Why do the routines run so slowly?

The answer is because we are using interpreted BASIC as our programming language. The general idea of these routines is to illustrate the principals which are involved. To do this with machine code would limit the audience to readers who are familiar with assembly language - which isn't everybody - or those who are using Pascal (Incidentally the same routine in Pascal takes about 1.5 minutes). A screen dump involves around 64000 calculations which takes a while even for a fast BASIC like Locomotive. You can improve the speed a little by rewriting the routine using multi-statement lines but for real speed try Cliff Lawsons machine code routine which appeared in issue 4.

b. Why does the routine sometimes stop with an illegal function call error.

This is my fault - hangs head in shame - everything works fine in MODE 2 or in MODE 1 if you only use INKS 0 & 1. The original subroutine was written for the 'WHIRLY' program in ISSUE 1 which only used

MODE 2 and on incorporating it into the TOOLBOX I forgot to mention that it would only work properly with MODE 2 screens. The fix for this is simple -make sure that the TEST result is effectively always 0 or 1 by changing TEST(L%*2,pixln-??) to 1*(TEST(L%*2,pixln-??)>0)

Now for this months TOOLBOX routines which will complete the set needed before we start on our SKETCHPAD program plus the first major routine for that program - the one to move the cursor around the screen without leaving a trail behind it.

START LINE	ROUTINE NAME	PURPOSE
22200	SAVESCREEN	Saves a copy of the screen in BIT IMAGE form to the default storage device (tape or disc.
22300	LOADSCREEN	Loads a previously saved screen back from tape or disc.
22400	JOYMAP	Re-designates the codes generated by joystick 0 to produce the same codes as the cursor keys.

Saves a copy of the screen in BIT IMAGE form to the default storage device (tape or disc). Loads a previously saved screen back from tape or disc. Re-designates the codes generated by joystick 0 to produce the same codes as the cursor keys.

COMMENTARY

SAVESCREEN

Entry Conditions: You specify the filename which you want to save to by setting the variable FLNAM$. The CPC464 will automatically sense whether you are using tape or disc, and if using tapes then the faster of the speed options is used. Each screenfull saved in this way takes up 16K so it is a good idea to ensure that you have enough disc space before using the routine.

```
SAVESCREEN

22200 REM ***************
22210 REM * SAVE SCREEN *
22220 REM ***************
22230 REM
22240 SPEED WRITE 1
22250 SAVE "!" + FLNAM$,B,%C000,&4000
22260 SPEED WRITE 0
22270 RETURN
```

LOADSCREEN

Entry Conditions: As for SAVESCREEN. If you are using a disc drive (highly recommended) then the re-load takes no more than two seconds.

```
LOADSCREEN

22300 REM ***************
22310 REM * SCREEN LOAD *
22320 REM ***************
22330 REM
22340 LOAD "!" + FLNAM$
22350 RETURN
```

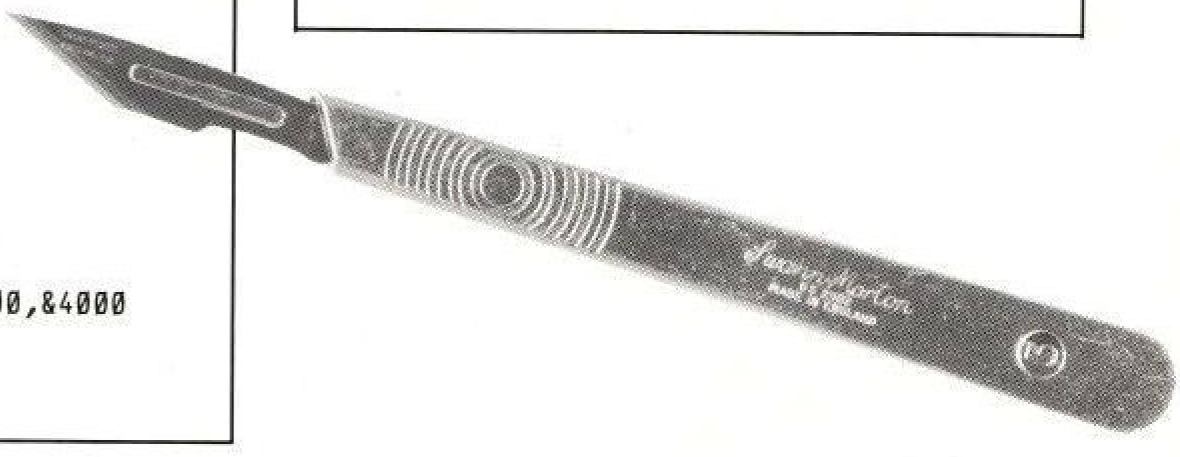
JOYMAP

Entry Conditions: None. Remember to reset your computer by using **[CTRL] [SHIFT] [ESC]** after using a program with this routine or a game which uses joysticks may not work properly.

Next month I will have the SKETCHPAD program which uses all of our TOOLBOX routines and, in addition, will use both solid brushes and an adjustable airbrush for painting with. To start the project off we finish this month with the cursor control routine for the SKETCHPAD. The variables CX% & CY% define the screen position of the graphics cursor and CXH%, CXL%, CYH% & CYL% define the boundary of the drawing area. Values will be assigned to these in the initialisation routine.

```
JOYMAP

22400 REM *******************
22410 REM * REMAP JOYSTICKS *
22420 REM *******************
22430 REM
22440 KEY DEF 72,1,240 : REM UP
22450 KEY DEF 73,1,241 : REM DOWN
22460 KEY DEF 74,1,242 : REM LEFT
22470 KEY DEF 76,1,13 : REM FIRE 2
22480 KEY DEF 77,1,13 : REM FIRE 1
22490 RETURN
```



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CRASH Readers Awards 1984 Winner

Amstrad CPC464
Speech Synthesizer

The dk'tronics Amstrad speech synthesizer and powerful stereo amplifier uses the popular SLO/256 speech chip and has an almost infinite vocabulary. It is supplied with a text to speech converter for ease of speech output creation. Everything you wish to be spoken is entered in normal English, without special control codes or characters, it is therefore extremely easy to use. The voicing of the words is completely user transparent and the computer can carry on its normal running of a program while the speech chip is talking. The speech output from SLO/256 is mono and directed to both speakers.

Stereo Output

To utilise the Amstrad stereo output on the back of the computer, the interface has a built in stereo amplifier, this gives all sound output a totally new dimension and greatly improves the sound quality and volume over the computer's internal speaker. Any sound that previously came out of the mono speaker will now be sent out via the interface in stereo. All programs that use the sound in anyway (i.e. commercial software) will now output through the interface, which is fitted with volume and balance controls.



Speech Synthesis

The Amstrad speech synthesis utilises parts of the spoken word known as allophones. These are actual sounds that go to make up speech. The SP0256 allophone speech synthesis technique provides the ability to synthesize an almost unlimited vocabulary. Fifty-nine discrete speech sounds (allophones) and five pauses are stored in the speech chip's internal rom.

Text to Speech

Although there are only 26 letters in the alphabet, letters have a totally different sound when used in different words. For example, The "a" in 'Hay' is much longer and softer than in 'Hat'. When you speak you automatically make adjustments because you know just how a word should sound Not quite so easy with a computer.
The machine code software is mainly developed to this mode of operation. 3.5K is used for tables which contain the rules & exceptions to the rules of the English Language.
e.g. I before E except after C) This therefore allows the user to enter words to be spoken in normal English.

Speakers

Supplied with the Speech Synthesizer are two high quality 4" speakers these have been designed to compliment the Amstrad Computer. They are fitted with 1 metre of cable and can be positioned for the best stereo effect. The synthesizer interface fits neatly on to the rear of the computer. It has a through connector to enable other interfaces (e.g. Disc Drive) to connect to the rear of the synthesizer for ease of expansion Please send S.A.E. for a copy of the instruction manual which will give full and comprehensive details.

New Basic Commands

There are 8 new Basic Commands which control all the functions of the interface. Making the Synthesizer very easy to use. You can even control the speed at which it will talk to you. Or use the synthesizer to create sound effects like a fourth sound channel.

10 PRINT " 'AMSTRAD' "

The above is an example of the Syntax for entering speech into the computer and shows how simple it is to use.

The instruction book gives comprehensive details and examples of how to use the interface both from machine code and basic.

How to Order

The Amstrad Speech Synthesizer costs only £39.95. You can obtain your synthesizer through any good computer store or by completing the order form and returning it to:
dk'tronics Limited, Shire Hill, Saffron Walden, Essex. OR
by telephone quoting your barclaycard or access number. Orders normally despatched within 24 hours.

dk'tronics

Saffron Walden, Essex CB11 3AQ
Tel: (0799) 26350 10 lines

Please rush me

.....[QTY] Amstrad Speech Synthesizer at £39.95 +£1.25 p&p
I enclose cheque/PO/Cash for Total £........................
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